

LAST WORD SOCIETY

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Evidence of Pin Implantation as a Means of Verifying Death During the Great Plague of Marseilles (1722)

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ABSTRACT: The evidence obtained for the methods used in verification of death during the Great Plague of Marseilles in 1722 is presented here. This evidence was gathered during the excavation of a mass grave dating from this epidemic, and is based on two adjacent interments. The technique used at that time was the implantation of bronze pins into the toes. This method is precisely described in the medical treatises dating from this period, which list different death verification methods. The fear of "false death" and the burial of still living people characterized the end of the 17th and the 18th centuries. It should be noted that the main cause of apparent death is presented in the same medical treatises as the plague. This observation is the first anthropological evidence of the use of this forensic method to verify the fact of death.

KEYWORDS: forensic science, forensic anthropology, plague, death verification, apparent death, Marseilles, 18th century

The great plague of Marseilles accounted for about 50,000 victims (1). Corpses were buried in many graves scattered all over the town. Surprisingly, no anthropological studies have, as yet, been performed on these victims. A mass grave dating from this 18th century epidemic was recently discovered in the city center

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This research is a part of collaborative project entitled "Dynamic Pattern in Human Skeletal Biology" between the Laboratoire d'Anthropologie biologique, Faculté de Médecine de Marseille, Université de la Méditerranée, France; the Department of Physical Anthropology, Cleveland Museum of Natural History, Cleveland, Ohio, USA and the Department of Anatomy and Anthropology, Faculty of Medicine, Tel Aviv University, Israel.

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at the site of a planned housing development. A proposal for a complete anthropological study of this mass grave was submitted as a part of our research proposal on the archaeology of human infections (2). The site was excavated in 1994. About 200 skeletons were taken out of this pit, which was dug at the time of the epidemic in the garden of the "Observance" monastery. A multidisciplinary (anthropological, paleopathological, historical, microbiological) study of this mass grave is in progress. The aim of this paper is to present the first evidence of a forensic practice used during this epidemic and observed on two neighboring interments: verification of death by implantation of pins into the toes.

Methods

In the field, excavation was performed using the generally accepted method of field anthropology (3). In the central area of the pit, in order to obtain the data on the mode of interment of plague victims, two of us (O.D., M.S.) performed a planimetric excavation on a limited area and charted the precise position of the skeletons found. This very careful technique, using the same methodology as that applied to prehistoric digs, allowed us to observe the pins in place in the articular space of two of the 22 skeletons found in this area.

In the laboratory, age and sex determination were made using a combination of different techniques from anthropology and forensic sciences (4-6). We analyzed the precise position of the skeleton in the field in order to determine the chronology of burial and used forensic methods to interpret the states of rigor mortis processes. Reconstruction of pin implantation process on a cadaver's toes was performed using a similar needle.

Historical research has been done by one of us (M.S.) in the archives of the city in order to authenticate and date the mass grave and in the old medical treatises of XVIIth and XVIIIth century in order to document the different forensic techniques used.

Results and Discussion

Field Anthropology

Our work revealed the presence of a bronze pin in situ in the skeletons of the toes of two neighboring corpses, (numbers S 155 and S 158, Fig. 1). In the case of S 155, the point of the pin touched the distal tip of the first phalanx, at the anterior and inner

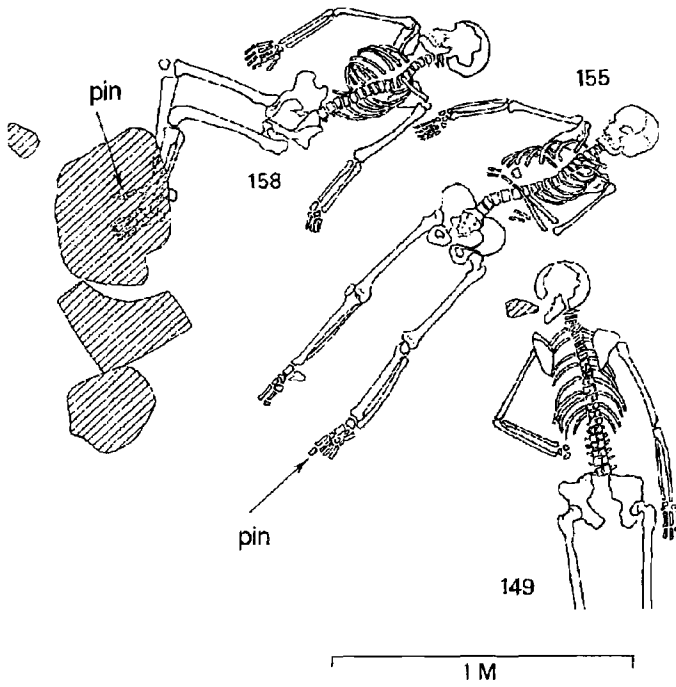


FIG. 1—A close view of the burial S 155 and S 158 (drawing by J. Da Silva & Y. Assié).

part of the articular area at an angle of about 30° to the axis of the first phalanx, in the horizontal plane (Fig. 2). In the case of S 158, a Roman concrete block weighing around 40 kg was positioned on the distal skeleton of the lower leg. The floor of a roman *domus* was destroyed by the gravediggers in May 1722. After the removal of this block, we discovered, in situ, a twisted bronze pin in close contact with the phalanx of the right big toe (Fig. 3).

The presence of such pins associated with these two skeletons, clearly discovered and observed in the articular space, cannot be interpreted as fortuitous, or having occurred, for example, during the fixing of the shroud but clearly indicates a deliberate act. The historical records revealed that during this epidemic, the shroud was only sewed and not simply fixed by pins (9). The position of

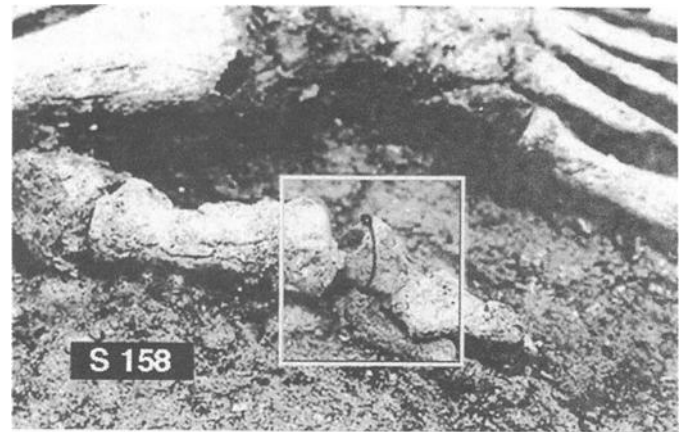


FIG. 3—S 158, a twisted bronze pin discovered in place in contact with the first phalanx of the right big toe (photo by M. Signoli).

the skeletons did not reveal any postmortem changes; every part of the skeletons was perfectly in place.

Type of the Pins

The bronze pins matched the type used to bind the pages of great plague data books together, as found in Marseilles' file archives dating from the beginning of the XVIIIth century (Fig. 4).

Anatomical Reconstruction

The method of implantation of these pins was better understood after a reconstruction on an anatomical specimen using needles of similar length and diameter. In the first case (S 155), the position and orientation of the pin observed in the field led us to believe that the pin had been introduced under the big toenail. The reconstruction showed us that in this method, if the pin is almost completely driven under the nail, the extremity of the pin comes in contact with the distal part of the first phalanx, on the anterior part of the articular surface. The angle with the axis of the first phalanx in the horizontal plane is due to the hyperextension of the distal phalanx on the proximal one. In the second case (S 158)

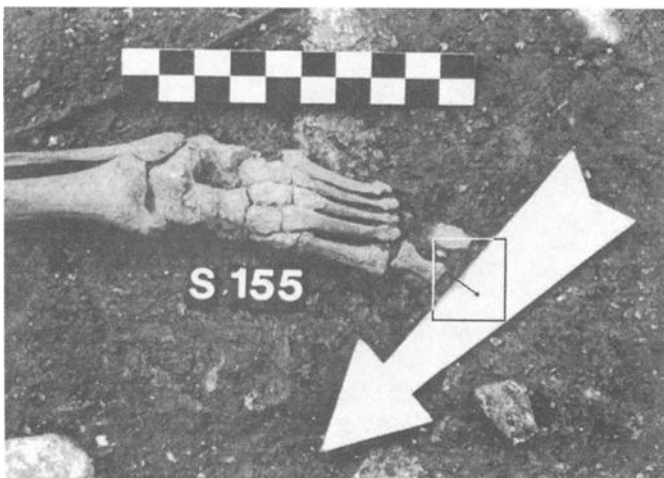


FIG. 2—S 155, showing the bronze pin in place, which touches the distal tip of the first phalanx at the anterior and inner part of the articular area (photo by M. Signoli).

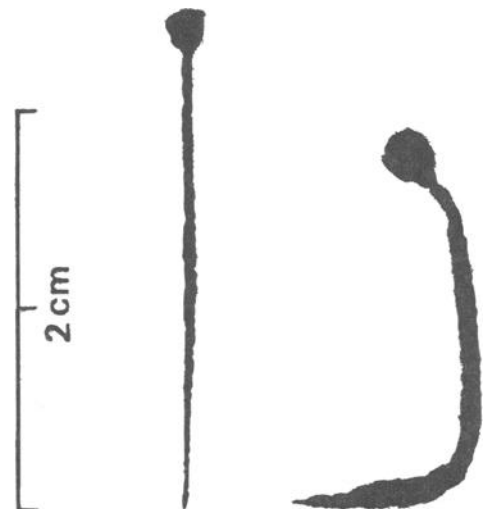


FIG. 4—The two bronze pins discovered in place in the skeleton of the toes of the neighboring burials S 155 and S 158 (drawing by Y. Assié).

the way of implantation is more complex: a very similar position had been obtained by the introduction of the pin outside the *extensor hallucis*, in close contact with the bone of the phalanx, then it was bent over the big toe. By this method, we obtained the same curvature of the pin (Fig. 4).

Position of the Skeletons

Details of the position of the two skeletons are given in Fig. 1. The skeletons S 155 and S 158 were both buried in dorsal decubitus. The position of the right upper limb of S 155 is in close contact with the left shoulder of the S 158. The patellae are in their anatomical position, the coxae are in close connection with the sacrum, the two pubes are in contact, and the collapse of the thoracic cage is moderate. These criteria lead us to believe that the corpses were deposited directly into the pit without a coffin (3).

The position of the skeletons can reveal information supporting the hypothesis of a fast burial after death. One can posit that the rigor mortis was not yet present in these cases. The rigor mortis is defined as the stiffness, and the retraction of the muscles after the death caused by the interruption of the ATP dependent processes. This rigor is common and constitutes a major sign of the real and permanent death. It appears about 6 h after the death, becoming complete by 8–12 h (10–14). The progression usually follows Nysten's law: jaw, nape, face, trunk, the upper limbs are semi-flexed, the inferior ones are extended. It disappears progressively following the same sequence within two days (11, 12, 14–16). The evolution of the process depends on the temperature, and on the speed at which putrefaction processes commence. It should be noted that rigor mortis can be absent following poisoning (phosphorus, mushrooms) or in cases septicemia (17–19). As observed with some of the skeletons buried in the central area of this mass grave (S 155, S 156, S 158, S 161, S 163), the position of the scapulothoracic articulation in abduction, demonstrated the pressure produced by the lack of rigor mortis, as did the semi-flexed position of the lower limbs (S 158). These observations are suggestive of a very fast burial after death in spite of the fact that the cause of death by septicemia may have been responsible of the lack the rigor mortis.

Sex and Age Determination

In both cases the skeleton is that of an adult woman, as determined by morphological analysis of the os coxae, which was well preserved. S 155 is that of a young adult, as determined by the study of the epiphyseal closure, which is just achieved on the iliac crest and the eruption of the third molar which has commenced. S 158 is that of a quite elderly woman, as determined by different techniques (vertebral and peripheral arthrosis, dental surface wear, cortical, and trabecular osteopenia).

Authentication of the Mass Grave

This mass grave was authenticated on the basis historical and archaeological data. Archeological and historical records indicated that this pit had been dug during the 18th century epidemic in the garden of a monastery used as hospital of quarantine and more precisely in May 1722 during the epidemic relapse (7,8).

Historical Data

The 25th of May 1720, the ship "Grand Saint-Antoine", returned from Syria carrying the plague. The quarantine was shortened,

due to pressure from the town's financial community (20) and this led to the introduction of the epidemic into Provence. The spread of this epidemic killed 100,000 persons in the region. In Marseilles, the number of the deaths was about 50,000 corresponding to about half of the population. During the paroxysm of the epidemic from June to August, the streets of the old city, were covered by 7000–8000 corpses (9). The epidemic lasted from June 1720 to August 1721. At the beginning of the spring 1722 an epidemic relapse was observed. The number of the victims varies according to the authors: 260 sick persons and 194 deaths according to Mery & Guindon (21); 174 victims reported by Carrière et al., (1) 700 people affected according to Colonna d'Istria (22) but never as many as a thousand. The city was again isolated. Some monasteries were again converted into hospitals, including the convent of the Augustins for the nobility, while common people were placed in the Charity. The convent of the Observantins was used as a hospital for quarantine. From the 18th to the 24th of May 1722 (1,7), 50 peasants were recruited to dig a grave in the gardens of this convent, a pit big enough to accommodate 20,000 corpses (8). This mass grave, was used from May 1722 to August 1722. It is the one we excavated in 1994.

Verification of Death in the Historical Record

The historical data at the end of the 17th and the 18th centuries revealed that in France there was a fear of "false death" and the burial of living people. This anxiety was based on a corpus of popular legends, and on the writings of classical authors. Platon (23) evoked the necessity of burying the corpses only after 3 days of exposure, in order to differentiate a real death from a lethargia (the Laws, XII, 959). Pline (Hist. Nat., VII, 53) quoted a case of revival during the cremation (24). This image was reinforced in the 16th century by some descriptions of cases of false death such as a premature dissection of a woman performed by the famous anatomist Vesalius (25). In the second half of 17th and 18th century, testamentary writings revealed a great number of requests asking for a public and prolonged exhibition of cadavers in order to verify the reality of death (26). At this time, the physicians reported on some cases of false death sometimes followed by premature burying or dissections. During the time of the epidemics, and especially during the plague, the risk of burying still living people was increased, due to the necessity of fast burial in order to avoid contagion (27,29). Some sanitary rules prescribed that the funeral had to be carried out during the first 6 h following death (9). However, during the plague epidemic in Marseilles, the rules specified that the grave-diggers could not take any cadaver without the authorization of the person in charge of the hospital (30). It is noteworthy that the plague epidemic provoked an indifference to the true state of cadavers (31). Bruhier d'Ablaincourt (29) (Fig. 5) reported the answer, made in provençal language of a grave-digger who was putting a still living man in his "tombereau" with cadavers: "*es proun mouert,*" that is to say: "*he has sufficiently died.*"

To avoid these premature burials, many tests of verification were described by the physicians (27). Among these techniques for verification of death, one notes the "surgical" methods including cutting, burning or implantation of pins on the palmar surface of the hands, scapular area, under the plantar surface of the feet, and the implantation of pins under the toe nails (*aciculam sub ungue digiti pedis*) (27,28,32–34). According to Winslow (33), the reliability of these surgical techniques was as poor as the other methods in use. The conception shared by physicians since the XVIIth

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DISSERTATION
SUR
L'INCERTITUDE
DES SIGNES
DE LA MORT,
ET

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& **Embaumemens précipités :**

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FIG. 5—Frontispiece of the medical treatise on forensic techniques by Bruhier d'Ablaincourt (1749).

century was that except for the first signs of putrefaction, nothing was truly reliable for the diagnosis of death: *ait, hominem verè mortuum non nisi incipiente putredine cadaveris certo cognosci posse* (27).

The medical treatises of the XVIIth and XVIIIth centuries carefully described many forensic techniques to verify if death was real and permanent, and in particular, the implantation of pins into the toes. It should be noted that the main cause of apparent death is presented in the same medical treatises as the plague. Our discovery is the first evidence in forensic anthropology of the verification of death by the implantation of pins into the toes during the great plague of Marseilles. This result underlines efficiency of collaborative research between biological anthropology, archaeological and forensic sciences in the understanding of medical behavior.

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