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MEDICAL EXAMINATION OF THE BODY BEFORE INCINERATION: COMPARED LEGISLATION

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Abstract: In some European countries, cremation is the preferred funeral method, being chosen by the majority of the population (UK, Czech Republic, Switzerland). In Romania, the certificate of burial or incineration of the corpse is issued by the civil status officer, after the death certificate has been released. Unidentified persons cannot be cremated. There are no special provisions for the incineration authorization. There are countries where a second medical examination of the deceased person (which has not been autopsied) is mandatory for incineration. The external examination of the corpse and the re-verification of the medical documentation that was the basis for establishing the cause of death are the essential tools for ensuring a legal certainty regarding a non-violent death. In the UK, Germany, Switzerland, Cyprus this second examination, by a forensic doctor or a health inspector, is required to obtain the incineration permit. Special legal provisions appear in the case of persons carrying pacemakers. These, if left in the body of the deceased could cause explosions during incineration, thus creating a risk of incineration. In France, Luxembourg, UK, Cyprus there is a need for a doctor to confirm removal of the pacemaker prior to incineration. We consider it necessary to supplement the Romanian legislation with provisions regarding the medical authorization of the incineration by re-examining the death documentation and/ or an external examination of the corpse, which will also include the problem of removing the medical equipment incompatible with the incineration from the body of the deceased.

Key words: incineration, external examination, legislation.

INTRODUCTION

The history of cremation

Cremation is a method of dead body disposal by combustion, carried out in electrical incinerators. It is a funeral rite alternative to burial, leaving behind approximately two kilograms of ashes which do not constitute a public health risk.

When talking about funeral rituals and customs in ancient times, it is important to identify the development of cremation. It is the Mesolithic epoch when cremation was first mentioned, especially in the practice of primary cremation burials in open sites. In the Frankhthi cave (Kiladha, Greece), 8 burial places were found, suggesting existence of post-mortem rituals; two individuals from this group (a man and a woman) were subject of incineration. Study of the bones endorsed the supposition that the temperature of cremation was more than eight hundred degrees Celsius and the bodies of the deceased were burnt while the bones were still covered by flesh (whole body incineration). Archeologists supposed that occasionally after initial inhumation, the de-fleshed bones of the deceased were collected from the primary burial location and intentionally disintegrated, to be finally cremated. After the completion of an inhumation, the entire funerary complex was sometimes covered with stone blocks as a mark of "closed place"[1-6].

The remaining cremation masses used to be buried in pits with a maximum depth of 40 cm below ground level. The most studied bi-ritual cemetery in Germany is Aiterhofen-Ödmühle which contains 68 cremation graves among the total of 228, at depths of 55 to 96 cm below ground level. The cemetery in Kralicena Hané (Olomouc region, Czech Republic) contains cremation burials in clear majority (69 *vs*. only 9 inhumation burials)[6, 7].

Invention of high-heat ovens (15th century) and

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gas-ovens (19th century) have been important steps in developing incineration habits. Three Italian scientists worked independently to invent an oven which can produce enough heat to cremate a dead human body. Professor Brunetti presented it at the Vienna Exposition (1873) and five years later the first crematory in Germany was built and opened in Gotha city (state of Thuringia) [8].

Until recently, it was considered that the funeral rite of the Neo-Eneolithic communities on the current territory of Romania was exclusively inhumation. The existence of Neo-Eneolithic incineration practices was viewed with hesitancies by some Romanians archaeologists, because of the lack of anthropological evidence. However, several discoveries have proven that cremation was practiced during this period: early Neolithic- Starčevo - Criș culture, grave M7 from Gura Baciului (Cluj county); middle Neolithic and early Eneolithic- Zau culture, with graves at Tășad, Suplacu de Barcău, Porț, Zalău (Sălaj county) and Iclod (Cluj county). From a geographical point of view, these are found in the Transylvanian area, especially in northwestern Romania [9, 10].

In Romania, Dr. Iacob Felix supported the idea of cremation in the 19th century, for hygienic reasons; after anepidemic he proposed the incineration of the corpses in order to stop spreading the disease. The Romanian Cremation Society (Cenușa - "Ashes")was created in Bucharest (1923). In February 1928, the Bucharest Crematorium, started its operations carrying out few hundreds (200 - 600) of human cremations every year. In 1935 the rate of incineration as funeral ritual was 0.19% of the total deaths. During the 20th century cremation was used for negative reasons as well: for erasing the trace of some violent actions that happened to the regiment opponents – incineration of the Romanian minister Armand Călinescu in 1939 and the cremation of certain people who died during the Revolution from Timișoarain1989 (The Rose Operation/Vama Operation). Nowadays in Romania there are 3 human functional crematories, in Bucharest (Vitan – Bârzești Crematory), Oradea (Phoenix Cremation Services) and Moldovenești – Bădeni (Cluj County, Pro Ignis Crematory) [11, 12, 13].

In today's United Kingdom, Czech Republic, Slovenia, Switzerland, and most of the Northern European countries, cremation is the preferred form of burial for nearly 80% of the deceased persons while in other countries(Belgium, Luxembourg, Netherlands, and Portugal)cremation accounts for more than one half of all burials. In Austria, Finland, Russia, Norway, Spain, and France, more than one third of people choose cremation as the preferred form of disposal of their dead bodies. On the other hand, cremations are below 20% in Serbia, Italy, Ireland, and are almost negligible in Romania [14]. The majority religion influences the cremation percentage, since the Orthodox Church acknowledges burial as the only way of decomposition of the dead body, although it has no objection to the burning of the dead bodies of heterodox people and people of other religions [15].

Burial and Cremation laws in Romania

In Romania the place and the manner of burial shall be in accordance with the will expressed by the person during his lifetime, without any modification of his last will. If no wish has been expressed, the place and the manner of burial shall be decided by the next-of-kin or authority that takes care of the burial[16]. The incineration request shall be completed and signed by one of the following persons: the person who is committed by contract that he will take care of the funeral; the person established by the will of the deceased; in the absence of the will, the spouse of the deceased person, who lived in the same residence with the deceased person in the last part of his life; another close relative of the deceased, up to the fourth degree inclusive; the mayor of the town/village where the death took place. The request will include the identification data of the applicant and the deceased and will be accompanied by a copy of the death certificate and a copy of the identity card or passport of the applicant. In order to incinerate a foreign person deceased in Romania or in the case of a foreign person deceased in another country and transported to Romania, the approval of either the citizenship Country's consular office in Romania or of the competent authorities from the last domicile is necessary. In Romania it is not allowed to cremate unidentified deceased persons. The law is restrictive and there is a double regulation regarding unidentified persons, in the way that medico-legal autopsy is mandatory for this category. In Germany there is a permissive law: incineration of unidentified persons is possible only with the approval of a judicial authority. In the USA there are no regulations about unidentified persons, therefore the decision of incineration, burial or keeping in morgue the unidentified persons remains to the coroner [16, 17, 22, 25].

In Romania, there is a need for a moral-critical appreciation on the opportunity of introducing cremation in the society, a society that lacked experience in this funeral procedure throughout its history. It is

considered that the implementation of this procedure in Romania is premature, depending on both resolving the ethical dilemma and the emergence of additional specific legal regulations [18].

Cremation laws in Europe

There are some differences within the UK in regard to the cremation and burial laws. In Scotland, the Burial and Cremation Act 2016 provides the fundamentals for cremation. Every death in Scotland must be certified by a doctor who completes a Medical Certificate of Cause of Death (MCCD) which is compulsory for death registration and release of the Certificate of Registration of Death, required before a burial or cremation can proceed. All deaths cases which are sudden, suspicious, unexplained, or unexpected are reported to the Procurator Fiscal who may instruct the police to investigate the circumstances of the death. There is specialized unit (Scottish Fatalities Investigation Unit - SFIU)in charge for investigating these deaths and it will decide if additional investigation is required. The cremation cannot take place until the SFIU issues an approval for cremation [19]. In England, Wales, and Northern Ireland, there are two medical certificates as well (form Cremation 4 and 5). One is completed by the doctor who treated the deceased person during his or her last illness, while the other is completed by a doctor who did not treat the deceased person and who is completely independent of the first doctor. The second doctor will examine the deceased person and discuss the cause of death with the first doctor and at least one other person. In medico-legal cases, the coroner will authorize the cremation to take place and this will be provided through completion of a specific form. If it appears that the deceased person died directly or indirectly as a result of violent event or by unfair means or from any cause other than natural illness for which he had been treated by a registered medical practitioner within twenty-eight days prior to his death, the coroner shall decline to allow the cremation unless a special certificate is given. It is worth to mention the Belfast City Council Form, that provides information on whether a hazardous implant is present and whether it has been removed; this must be completed by the doctor who completes the cremation form by the coroner [20, 21].

In Germany cremation of a corpse may only be carried out if a second mortality inspection has unequivocally revealed that there is no indication of a non-natural death. The second coroner examination shall be performed by a medical officer of the Public Health Service of the counties and the municipalities. The counties and independent cities may authorize other medical persons, who are recognized as having the area of legal medicine, pathology or public health, to carry out the second mortality show in their district, either in general or on a case – by – case basis. If corpses are to be subjected to an anatomical corpse opening, the districts and independent cities may authorize medical personnel in an institute of anatomy to perform the second coroner's dissection in their district, either generally or on a case – by – case basis. If, after the second coroner examination, it is unequivocally established that a fault of third parties can be excluded from the death, a certificate of release for cremation must be issued. If there are indications of an unnatural death, the police department is notified. In that case, the cremation takes place only after the prosecution has approved it [22].

The examination of a dead body in Switzerland is ruled by sanitary laws issued in every canton. Burial may take place after an average "waiting period" of 48 hours (24 – 120 hours, depending on canton) or sooner if an autopsy was performed or for epidemiological reasons. For cremation, a non-violent (natural) death must be certified by a physician and the confirmation from an official doctor is required as well (second opinion). If the case was referred to the police, the penal investigation authority must agree with cremation, after reviewing the relevant medical report [23].

In Cyprus, The Human Cremation Act of 2016 is revealing the following information: for the purpose of issuing an incineration permit, the Governor shall ensure the following: A medical certificate for the cause of death by a registered physician or, in the event of a post mortem examination, a death investigator order permitting the burial of the remains. The incineration body is allowed under the following conditions: The removal of any organs from the body has been completed in the event of an organ donation statement; all medical inappropriate parts for incineration have been removed from the body. 'Incompatible medical equipment' includes all types of pacemakers, clothing or footwear containing a percentage of elastomers or vinyl chloride, jewellery, glasses, and any other non-combustible foreign material (excluding dental implants). Despite of legal provisions, cremation is not possible in Cyprus as there are no cremation facilities, so repatriation abroad is necessary if the deceased had expressed the wish to be incinerated [24].

Cremation in United States of America (USA)

In Florida there are minimum prerequisites for the medical examiner services, while a Medical

Examiners Commission composed of seven persons (appointed by the State administrative, judicial and medical authorities) is in charge for the creation of medical examiner districts in the state (24 medical examiner districts at present). The causes of death can be separated into following categories: related to the circumstances surrounding the death – homicide, suicide or accident; suddenly; unattended by a physician; death in custody (police, prison); in any suspicious or unusual circumstance. If a body is to be cremated, prior determination of the cause of death is necessary. Physical inspection of the decedent's remains is typically required. When a death occurs under common circumstances, an autopsy or medico-legal investigation is not performed. In case of a cremation permit is required, the funeral director should discuss with the county medical examiner or forensic pathologist concerning the physician's death certificate. Determination the cause of death implies the death certificate sending to the decedent's attending physician for signature and after that forwarding it to the district medical examiner for review. If the medical examiner doesn't detect an issue concerning the cause of death, he agrees, and the funeral director may advance with the disposal of the remains [25].

Discussions and literature findings

The deficient quality of external post-mortem examination is a permanent subject of professional and ethical debate. It depends on the external post-mortem examination if further criminal investigations are necessary to clarify the cause of death. It is therefore an essential instrument to ensure legal certainty. In some countries a second external post-mortem assessment is performed before cremation by a designated medical officer in UK, Germany, Switzerland, Cyprus to make sure that errors of the first examination are corrected [26].

Performing a literature research, we found a few studies that demonstrate the importance of a second external post-mortem examination. Three articles elaborated in medico-legal Institutes from Germany clearly reveal the consequence of the second external examination. In 1995, a multicenter study involving 36 out of 38 German medico-legal Institutes have reached to the conclusion that without the mandatory external examination before cremation, solving relevant non-natural deaths is impossible. In case of a complete external examination, a total of 18,000 non-natural deaths including approximately 180 homicides could be detected per year during the first external examinations. 882 post-mortem examinations before cremation were performed in Halle from 1993 to 2007. The manner and cause of death encountered significant differences between the first inspection and the post-mortem. The rule of inspecting the corpse a second time before cremation was considered clearly indispensable, even if it is limited. A retrospective analysis of more than 16000 external body examinations before cremation from Bonn over a ten years' period concluded that deaths wrongly classified in the first external post-mortem were generally accidents and deaths associated with medical procedures. The value of second external examination is limited in homicide cases with few external traces, but it might be important in cases with ignored external signs. Still, there is a consensus among professionals that autopsy continues to be the gold standard for a trustworthy assessment of the cause of death [27-29].

Another study on cremation clearance (Connecticut, USA. 2016), questions whether physical inspections detect more unnatural unreported deaths than documents-only based medico-legal investigation. All deaths reported to the medical examiner for cremation authorization during 2 years were reviewed and compared subsequent revisions of death certificates after 2 different investigative methodologies (with and without physical inspection). Results indicated that both methods, do equally detect unreported unnatural deaths [30].

Trübner *et al.* published a case of misdiagnosed cause of death in a 76 years old woman. The initial examination stated psycho-organic brain syndrome as the cause of death, while the second external examination (compulsory before cremation) identified massive hematomas on the thorax and hematomas on the cephalic extremity. A medico-legal autopsy was ordered and multiple rib fractures, fractures of the skull, fat embolism and hemo-pneumothorax were established. Next of kin were identified and held responsible for murder. The case is a good example of improper first external examination corrected by the second mandatory examination [31]. Determination of the manner and cause of death based on the external examination is a challenging task even for the experienced pathologist. Non-violent deaths are often not recognized or the possibility to attest a death as unclear is not sufficiently used [26].

Throughout the external examination, is important to remove any electromechanical device that can interfere with the cremation. The threat of undetected cardiac pacemakers exploding in crematoria

is well known. The number of artificial cardiac pacemakers is rising, as is the number of cremated bodies. Implantable cardiac pacemakers are common devices which improve quality of life, especially in elderly patients; the prevalence of pacemakers will increase. The cremation hazard of this percutaneous pacemaker remains a significant problem [32, 33].

In the UK, France, Luxemburg and Cyprus there is a question on the cremation form asking the physician if the deceased had a pacemaker and if it has been removed. First case of a pacemaker explosion during cremation was in reported in 1976. The body of an old man was cremated at 800°C and after few minute multiple explosions occurred in rapid succession with a final explosion some minutes later. Among the cremated remains, there were five discs, a short length of wire and a metal plate. The device was identified as a zinc/mercuric oxide pacemaker. These pacemakers explode on cremation because of the rapid formation of hydrogen gas which bursts the pacemaker casing [33, 35]. Today, most pacemakers have a lithium iodine battery which are of minimal weight, corrosion resistant and have good current drain characteristics, safety and long life. Battery development plays a key role in pacemaker design because small-volume high-energy power sources are required. It is hypothesized that the more energy dense a battery is, the greater is the risk of explosion. As they are implanted subcutaneously, pacemakers can easily be removed by a small incision before cremation [33-35].

Explosions of medical devices are infrequent, but they may damage the cremation facility or even create injuries to staff. Most pacemakers have lithium – based batteries which at room temperature are harmless but during cremation, at more than 1000°C a gas that rapidly expands forms, causing the pacemaker casing to disintegrate. New generation pacemakers will be likely more explosive and more difficult to spot post-mortem (smaller and with higher energy). Inappropriate cremation of pacemakers should be avoided by proper paperwork prior to incineration procedure. Beside damage costs, there is also a risk of legal proceedings against funeral companies or physicians and health authorities to recover losses. Simple metal detectors might help identify pacemakers in the deceased [34-36].

In conclusion, we consider it necessary to supplement the Romanian legislation with provisions regarding the medical authorization of the incineration by re-examining the death documentation and/ or an external examination of the corpse, which will also include the problem of removing the medical equipment incompatible with the incineration from the body of the deceased.

Provisions regarding the removal of medical equipment incompatible with incineration from the body of the deceased are also necessary.

Conflict of interest

The authors declare that they have no conflict of interest.

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