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Exhumation as a matter of fact

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Abstract

The results of 371 autopsies, following exhumation, were evaluated. On average, the time elapsed after burial was 74 days, varying from 9 to 478 days. All exhumations were carried out for medical insurance reasons. In all cases these were exclusively male bodies, ranging in age from 27 to 87 years, with a mean age of 66 years. In 99.2% of the cases, the issues in question could be clarified. The morphological findings (both macroscopic and microscopic) were gathered and the maximum post-mortem period after which these could still be demonstrated was established and compared with those described in literature. The existing, so called, catalogues of expectation, could be expanded and augmented. An Exhumation Database, compiling all previously published exhumation results, was constructed.

Keywords

Autopsy, Exhumation, Morphological findings, Post-mortem period, Catalogues of expectation

Introduction

An exhumation is carried out when issues, which can only be clarified by an autopsy and possible supplementary examinations, arise after burial.

Forensic indication, as in the case when a belated suspicion of an unnatural cause of death arises, makes an exhumation mandatory.[1] In such cases, an autopsy, ordered by the public prosecutor, is performed. This may also be a second autopsy.[2]

Exhumations are frequently requested when medical insurance problems arise.[3] Most cases are initiated by health insurances rather than by next-of-kin. Either the question whether an occupational disease was present and relevant to death has to be clarified, or the consequences of an accident need to be assessed. As a matter of principle, family members have the right to refuse a medical insurance autopsy, but often risk losing all financial claims they have on the insurance in consequence. This autopsy process and the role of the insurance company is specific to Germany.

When an exhumation is being considered, the ordering party would like to know how good the chances of clarifying the issues in question will be.[4] Particularly for an insurer, there is the question of profitability. Compared to an autopsy performed immediately after death, an exhumation brings additional costs for the excavation of the grave, transport, cleaning, medical examiner's fee and reburial.[5] Whereas important toxicological[6,7,8] and osteological evidence[9,10,11] can still be recovered after decades, the recovery of morphological evidence depends on the state of preservation of the corpse. Apart from the time elapsed post-mortem, there are different variables influencing decomposition, i.e. seasonal environmental factors[12,13], soil conditions[6], and coffin material.[14]

These influencing factors cannot be standardized and are difficult to represent statistically. For this reason, different work groups have collected morphological findings, together with the maximum post-mortem period in which they could still be demonstrated, in a so

called "catalogue of expectation"[2,4,15,16] to supplement published case collections[12,14,17,18,19,20,21,22]. The most recent study dealing with previously undiscovered homicides in 155 forensic exhumations was conducted in Münster (Germany) in 2004.[23]

In the years 1967 to 1998 the Department of Pathology, Occupational Associations Hospital, Bergmannsheil-Bochum performed 400 exhumations - all for medical insurance reasons. The collected morphological results from this study, including the maximum post-mortem period in which they could still be found, were gathered to elaborate the hitherto published insights. In addition, the success of autopsies following exhumation as a means for answering the issues in question was evaluated. Two aspects of this study, the pertinence to medical-insurance issues[24] and the microscopical findings[25], have already been published. This paper presents the bulk of the findings from the study and compares them to those documented in literature.

Materials and Methods

The basis for this evaluation were the documented files (autopsy reports and written evaluations) which were archived for all the autopsies performed by the Department of Pathology, Occupational Associations Hospital, Bergmannsheil-Bochum for the years 1967-1998. In addition, histological slides were available up to 1976. Criteria for inclusion in the study were the presence of complete autopsy protocols and evaluation reports.

371 cases could be included in the study. In three quarters of the cases, the deceased had lived and worked in the Ruhrgebiet, the biggest congested German urban area, and were also buried there. Since the Department of Pathology in Bochum is specialized at a national level in the performance of medical insurance autopsies, the other cases came from different regions of the Federal Republic of Germany. The corpses were all buried according to German burial laws. The cemeteries had variable soil conditions. Preparation of the corpses prior to burial, i.e. embalmment, did not take place. In most cases, the post-mortem examiner was not present during exhumation. Specifications about the soil conditions were not given for any of the cases. The autopsy was performed on site, at the graveyard, if this was possible. Otherwise, the body was transferred to the Department of Pathology or another graveyard. In all cases, complete autopsy was performed with removal of organ packages.[26] After formalin fixation, representative parts of the organs

were processed histologically. All slides were stained for EvG and HE, and histochemical stains were performed.

Results

The average number of days after burial for the 371 exhumations was 74. The shortest period was 9, the longest 478 days. All bodies were male, aged between 27 and 87 years at death (average 66).

The majority of the issues in question concerned occupational diseases (93%). 12% of the issues were concerned with the consequences of accidents, either alone or in combination with an occupational disease. In 99.2% of the cases, a definite recommendation for the medical insurance questions concerning the right to compensation was achieved.

In all, 300 different diagnoses were established. For a better understanding, 181 diagnoses are presented in seven subdivisions (Tables 1-7). The results are listed in tables, together with their maximum post-mortem intervals. The longest post-mortem intervals listed for results previously described in literature, are included in the tables as a means of comparison.

Discussion

In the present study, the, as yet, largest case collection of exhumations was available. The largest previously described collection contained 200 cases, but was, however, not evaluated systematically.[22] The most extensive study with a catalogue of expectations contained 131 cases.[16] Apart from the extensive number of cases, the presented case collection is unique, compared to cases in literature, in that all exhumations were performed exclusively to clear medical insurance issues. The second distinction is that only male bodies were investigated. Surprisingly, 99.2% of the medical insurance issues could be resolved. Even after a period of 478 days after burial, usable macroscopic and pathological anatomical diagnoses could be obtained. The existing catalogue of expectations could be expanded and augmented with the obtained results.

Of course, even the aid of a catalogue of expectations does not permit a definite prognosis for the success or failure of a planned exhumation. However, the documented maximum post mortem intervals do show whether an expected diagnosis is still feasible, and

with which expected frequency it can be found for the post mortem intervals (PMI). Corresponding soil conditions for findings and PMI were neither noted in this study nor in literature. In principle, therefore, it can be assumed that the best possible conditions existed for each constellation of finding and PMI in the catalogue of expectations. For a given case, an estimate is made possible, which can be corrected upwards or downwards, according to the available details on the resting conditions.

Since it is an arduous task to consult all the previously published catalogues of expectation, case collections and reports for a given case, an Exhumation Database containing all published results has been online since 2003 (Please click here for visiting the link).

In spite of an apparently optimistic prognosis, within the limits of the presented post-mortal periods, for autopsies after exhumation one should not forget that macroscopic, and particularly, microscopic, evidence[25,27] deteriorates with each post-mortem day. Thus, exhumation should and can only be a second best solution, even if it can bring light into many cases by supplying essential information for the resolution of forensic and insurance medical issues.

References

(1) Duff EJ, Johnson JS. Some social and forensic aspects of exhumation and reinterment of industrial revolution remains. Br Med J 1974;1:563-567. [PubMed] (Back to [citation] in text)

(2) Fatteh A. Exhumation, autopsy, second autopsy. Leg Med Annu 1978;151-163. [PubMed] (Back to [citation] in text)

(3) Naeve W, Bandmann H. Über Fragestellungen, Ergebnisse und Aussagewert versicherungsmedizinischer Obduktionen nach Exhumation. Lebensversicher Med 1981;33:37-42. [PubMed] (Back to [citation 1] [citation 2] in text)

(4) Grellner W, Glenewinkel F. Exhumations: synopsis of morphological and toxicological findings in relation to the postmortem interval. Survey on a 20-year period and review of the literature. Forensic Sci Int 1997;90:139-159. [PubMed] (Back to [citation 1] [citation 2] in text)

(5) Banaschak S, Eisenmenger W, Kuznik J, Brinkmann B. Exhumierungen und kein Ende. Eine vergleichende Analyse. Arch Kriminol 1998;202:38-43. [PubMed] (Back to [citation] in text)

(6) Weinig E. Die Nachweisbarkeit von Giften in exhumierten Leichen. Dtsch Z ges gerichtl Med 1958;47:397 -416. [PubMed] (Back to [citation 1] [citation 2] in text)

(7) Siegel H, Rieders F, Holmstedt B. The medical and scientific evidence in alleged tubocurarine poisonings. A review of the so-called Dr. X case. Forensic Sci Int 1985;29:29-76. [PubMed] (Back to [citation] in text)

(8) Grellner W. Toxikologische Nachweismöglichkeiten bei Fettwachsumwandlung und mehrjähriger Liegezeit. Arch Kriminol 1998;202:81-86. [PubMed] (Back to [citation] in text)

(9) Dinno ND, Kadlec JF, Stokes JD. Post-mortem diagnosis of osteogenesis imperfecta congenita by exhumation and radiological examination [letter]. N Engl J Med 1981;304:1367. [PubMed] (Back to [citation] in text)

(10) Salgado MS, De Alwis LB, Perera N. Identification from skeletal remains. Forensic Sci Int 1988;36:73-80. [PubMed] (Back to [citation] in text)

(11) Spennemann DH, Franke B. Archaeological techniques for exhumations: a unique data source for crime scene investigations. Forensic Sci Int 1995;74:5-15. [PubMed] (Back to [citation] in text)

(12) Raestrup G. Über Exhumierungen. Dtsch Z ges gerichtl Med. 1926;6:34-48.. (Back to [citation 1] [citation 2] in text)

(13) Froboese C. Über den Wert von Exhumierungen. Mschr Unfallheilk 1943;50:. (Back to [citation] in text)

(14) Nordmann M. Erfahrungen bei Exhumierungen. Zbl Path 1939;73:81-86. (Back to [citation 1] [citation 2] in text)

(15) Althoff H. Bei welchen Fragestellungen kann man aussagefähige pathomorphologische Befunde nach Exhumierung erwarten? [For which problems can one expect reliable pathomorphological findings after exhumation? (author's transl)] Z Rechtsmed 1974;75:1-20. [PubMed] (Back to [citation] in text)

(16) Seibel O, Heinemann A, Hildebrand E, Püschel K. 131 Hamburger Exhumierungen und ihre Bedeutung für die Rechtspflege und Versicherungsmedizin (1971-1995). [131 cases of exhumation in Hamburg and their significance for legal medicine and medical insurance (1971-1995)]. Versicherungsmedizin 1997;49:209-215. [PubMed] (Back to [citation 1] [citation 2] in text)

(17) Walcher K. Studien über die Leichenfäulnis mit besonderer Berücksichtigung der Histologie derselben. Virchows Arch Path Anat 1928;268:17-180. (Back to [citation] in text)

(18) Wenig K. Über Erfahrungen bei Exhumierungssektionen. Reichs-Gesd Bl 1944;19:169-172. (Back to [citation] in text)

(19) Reh H. Diskussionsbemerkung zum Vortrag H.J. Wagner. Dtsch Z ges gerichtl Med 1959;49:720 (Back to [citation] in text)

(20) Thomas F, La Barre J, Renaux J, Draux E. A therapeutic castastrophe, entailing 16 exhumations, following the administration of digitoxin instead of oestradiol benzoate to prostatic cancer patients: identification of the poison. Med Sci Law 1979;19:8-18. Z Rechtsmed 1974;75:1-20. [PubMed] (Back to [citation] in text)

(21) Riepert T, Lasczkowski G, Rittner C. Zusammenhang zwischen Arbeitsunfall und Todeseintritt 55 Jahre später. Nachweis trotz 2 1/2 Monaten Erdgrab - Ein Beitrag zur Aussagekraft versicherungsmedizinischer Obduktionen auch nach Exhumierung [Correlation between an occupational accident and death 55 years later. Evidence despite 2 1/2 months burial - a contribution to the value of insurance medicine autopsy also after exhumation]. Versicherungsmedizin 1993;45:91-93. [PubMed] (Back to [citation] in text)

(22) Brinkmann B, Madea B, Wuermeling HB. Exhumierungen aus strafprozessualen Anlässen. Eine vergleichende kriminologische Studie [Exhumation by reason of the criminal process. A comparative criminologic study]. Arch Kriminol 1986;177:65 -75. Versicherungsmedizin 1997;49:209-215. [PubMed] (Back to [citation 1] [citation 2] in text)

(23) Karger B, Lorin de la Grandmaison G, Bajanowski T, Brinkmann B. Analysis of 155 consecutive forensic exhumations with emphasis on undetected homicides. Int J Legal Med 2004;118:90-94. Versicherungsmedizin 1993;45:91-93. [PubMed] [SpringerLink FULL-TEXT ARTICLE] [✉] (Back to [citation] in text)

(24) Stachetzki U, Verhoff MA, Ulm K, Müller K-M. Morphological findings and medical insurance aspects in 371 exhumations [in German]. Pathologe 2001;22: 252-258. [PubMed] (Back to [citation] in text)

(25) Stachetzki U, Verhoff MA, Müller K-M (2002) Morphological findings after exhumation. Histopathology 2002;41(Suppl. 2):208-211 (Back to [citation 1] [citation 2] in text)

(26) Sommer A, Theile A. Einführung in die Obduktionstechnik. Stuttgart, Jena, New York: Gustav Fischer Verlag, 1996 (Back to [citation] in text)

(27) Strassmann G. Mikroskopische Untersuchungen an exhumierten und verwesten Organen. Vjschr Gerichtl Med 1921;62:131-144. (Back to [citation] in text)

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