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Frequency and Findings of Exhumations in Hamburg

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Introduction

Exhumations lie in the area of the forensic pathologist. Exhumations are carried out either under order of a public prosecutor, an insurance company, or the next of kin. In most cases the exhumation is ordered due to rising rumors about mysteries surrounding the death. These allegations can only be cleared-up by an autopsy with the determination of the cause of death. Very often the identity of the deceased, the connection between accident and death, accident reconstruction can only be established by an exhumation and the subsequent gathering of biological material as well as other traces.

In the public at large as well as in some medical circles, it is common knowledge that the decay of the corpse in a grave is so rapid that very soon after the burial no further information can be gathered from an exhumation with subsequent autopsy other than injuries to the skeletal systems as well as some intoxications. Ethical and aesthetic points of view are another reason for the rarity of exhumations.

In countless exhumations it has been proven that even after years of burial autopsies can lead to substantial diagnoses. The results obtainable depend on a multitude of factors: state of the deceased at the time of death, nature and duration of storage of the corpse between death and burial, the dress of the deceased, the fauna and flora on the corpse, the material of the coffin, the nature of the soil in which the coffin is buried, the site of the cemetery, the depth of the grave...

In spite of the rot found in exhumed corpses a multitude of inquiries regarding aspects of legal medicine can be answered. In criminal law even a negative autopsy result can be of utmost importance. The same holds for autopsies for insurance companies.

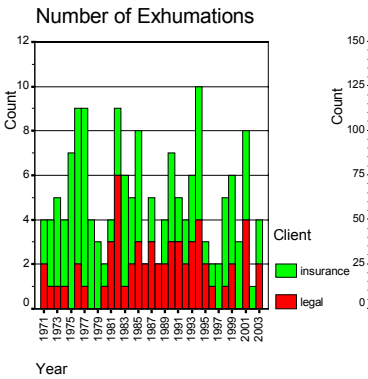

Figure 1:

Number of Exhumations carried out in the Institute of Legal Medicine, Hamburg, between 1971 and 2003.

The insurance exhumations concern, in nearly all cases, occupational diseases, i.e. try to establish whether the occupational exposition has lead to the death. Whereas the legal autopsies try to differentiate between natural and non-natural cause of death.

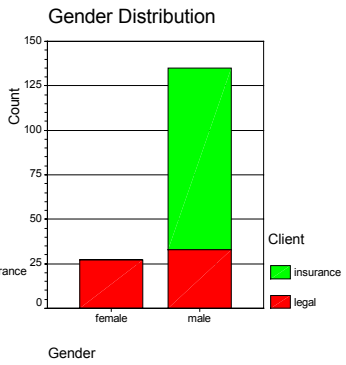

Figure 2:

The number of legal autopsies after exhumation exhibit nearly equal gender distribution. Whereas all insurance autopsies were on male subjects. This reflects the gender distribution during the 50th and 60th in the hazardous work environment like asbestos spraying in shipbuilding and fireproofing of high-rise buildings.

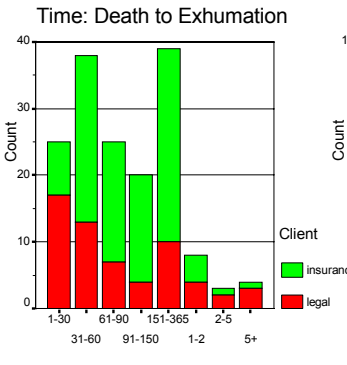

Figure 3:

A steady decrease in the number of legal exhumations with regard to the time between death and exhumation can be seen. The number of insurance related exhumations first rises (31-60 days) and then steadies for the period 60-365 days after which there is a sharp decline in numbers.

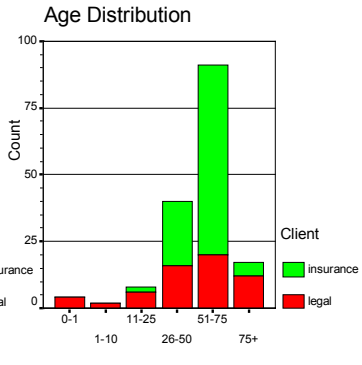

Figure 4:

Both legal and insurance related exhumations peak in the 51-75 years age group. The late onset of the insurance related exhumations is related to the time needed for the exposition of occupational hazards to result in severe disease.

Material and Methods:

All protocols of the autopsies carried out in the Institute of Legal Medicine in Hamburg, Germany, between 1971 and 2003 were searched for possible involvement of exhumation. All 41,197 protocols were screened and 162 exhumation cases (0.39%) were found. In all these cases the expert reports were evaluated as well. The cases were classified according to Table 3. In order to be able to compare the data to that of other regions in Germany (Köln, Münster, Erlangen) a strict separation between legal exhumations and insurance related exhumations was adhered to as the distribution between the two differs significantly between the regions.
The data was evaluated using SPSS Vers. 12.0.

Results:

Of the 162 autopsies after exhumation 60 were legal autopsies, i.e. ordered by the public prosecutor. The remaining 102 were insurance related, of which 6 were ordered by private persons, i.e. next of kin. The professional association for industrial safety insurance (BG) ordered 84 exhumations. A time-line is shown in Figure 1. In 155/162 cases the autopsy was classified as a success, i.e. the question at hand could be answered. The cause of death could be diagnosed in 150/162 cases. In 88/162 the assumed cause of death from the death certificate could be confirmed, in 31/162 cases it could be refuted.
The gender distribution of the legal exhumations is nearly equal (female: 27, male: 33). All the insurance related exhumations concern male subjects (male: 102, Figure 2).
A steady decrease in the number of legal exhumations with regard to the time between death and exhumation can be seen. The number of insurance related exhumations peaks in the second month after death and then continually declines (Figure 3).
Both legal and insurance related exhumations peak in the 51-75 years age group (Figure 4). The late onset of the insurance related exhumations is related to the time needed for the exposition of occupational hazards to result in severe enough a disease to possible qualify for an occupational disease.
Table 1 correlates the medical diagnosis with the time between death and exhumation, i.e. autopsy. The numbers have to be taken as ‚case reports' as they detail what we observed. Thus we can give no guarantee for those numbers. As stated, they reflect what we saw and what was reported in the literature.
Table 2 correlates the death certificate diagnosis with the diagnosis of the autopsy after exhumation. In order to put the difference into context the time between death and exhumation is specified in a separate column.

Diagnosis	Time / [day] Death to Exhumation
Artheriosclerosis	286, 292, 365,1581
Coronar Thrombosis, acute	59, 188, 166
Myocardial Infaction, acute	30, 47, 64, 84
Myocarial Scars	292, 556, 730,1581
Subarachnoidal Haemorrhagia	46, 84, 201
Lung Embolism	46, 50, 189, 390
Fat Embolism	37, 38, 50, 135
Asbestosis	185, 208, 288
Mesothelioma	64, 64, 210
Metastasis, Liver	44, 185, 262, 391
Strangulation Mark (Neck)	52, 77, 105, 125

Table 1:

Correlation of the cause of death with the time between death and exhumation in days is shown. The numbers are the maximum values in our sample extended by the samples found in literature. Thus the longest time we could diagnose myocardial scars was 1581 days. The next longest time was 730 days. It is important to note that the numbers stated are to be treated as case reports. The conclusion that after 1581 days every arteriosclerosis can be diagnosed under all circumstances is not valid. Effects like acidity of the soil and others stated in the introduction have not been taken into account.

Of particular note is the number of 288 days for asbestosis diagnosis. The number is so small because most of the cases are already attended to during the lifetime of the exposed workers. Only the rejected fraction, i.e. those workers who were not exposed to the necessary fiber-years, are examined after death. An even smaller fraction has to be exhumed in order to determine the fibers residing in the lung of the diseased. Most of the claims are settled well within the first year after death.

Clinical / Death Certificate Cause of Death	Exhumation / Autopsy Cause of Death	Time / [day] Death to Exhumation
Soporific Intoxication	Myocardial Infarction, rec.	47
Carcinomal of the Bladder	Cerbellar Insult	30
Myocardial Infarction	Death by Hanging	105
Encephalomalazia	Myocardial Insufficency	97
Struck by Lightning	Myocardial	70
Bronchial Carcinoma	Coronar Sclerosis	61
Cervical Spinal Injury	Acute Myocardial Infarction	146
Cerebrum Damage	Acute Myocardial Infarction	86
Natural Death	Polytrauma	153
Gastroenteritis	Ruptur Aortal Aneurism	157

Table 2:

Comparison of the cause of death as stated in the death certificate vs. the autopsy results after exhumation.

Of particular note are differences in natural death and non-natural death, i.e. myocardial infarction vs. hanging.

As is well known from other studies even severe injuries stated in the death certificate (i.e. traumatic spinal cord damage/rupture) need not to materialize during autopsy. But we also found a certified natural cause of death with a diagnosis of a polytrauma during autopsy.

Category	Cause for Exhumation	Count
I	Intoxication, Suspicion of	10
II	Traffic Accident	20
III	Medical Maltreatment, Suspicion of	15
IV	Cause of Death, Clarification of the	37
V	Manslaughter, Suspicion of	11
VI	Other Accidents	24
VII	Occupational Desease, Suspicion of	45

Table 3:

Classification scheme for the different causes for exhumation. Next to the great number of cases concerning occupational diseases (45/162); category 4, the unspecified clarification of the cause of death, is most prominent (37/162).

Conclusion

The autopsy is the gold standard with regard to the determination of the cause of death. In spite of conventional wisdom an exhumation will most often result in a diagnosis of the cause of death as well as the circumstance of the death and end all possible speculation.

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Case Reports




Case Report 1:
Suicide or Homocide

A 42 year old male was found dead in a hotel in Hamburg. An insulin surringe was found right next to the corpse. Mostly superficial wounds on both wrists and neck were diagnosed during the external examination. The wounds were contaminated with splinters of glas. The public prosecutor released the corpse for burial without autopsy, stating suicide as a cause of death: The man was supposed to have cut his wrists with a glass fragment from a broken picture frame and bled to death.

After a couple of mounth the mother of the deceased made claims of manslauter: The glass splinters in the wound with no resultant injury of the fingers of the corpse from handling the glass made her suspicious. Her claims were substantiated by formed bleedings she said were clearly visible on the photos of the claves.

As a result of these allegations the public prosecutor ordered an exhumation with an autopsy as well as a thorough toxicological examination. The autopsy took place 256 days (8 mounth) after the death of the patient.

No signs of manslaughter were found during the autopsy. Detailed inspection of the fingers showed small superficial cuts on the surface of the skin. The toxicological examination diagnosed a a non-toxical concentration of cocain in tissue. Furthermore an alcohol level of 0.063% was found in muscular tissue.

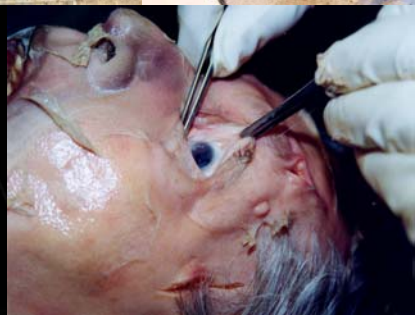
Cause of Death: Bleeding as a result of self-inflicted wounds to the wrists under the influence of alcohol and cocain.

Pictures:

- Digging up the coffin
- Pulling the coffin out of the grave
- Opened coffin
- Corpse just before the autopsy







Case Report 2:
Manslaughter or Death of Internal Cause

A 70 year of women was found dead in her flat. Because of here long medical history (breast cancer, diabetes mell., hypertonia, hyperthyreosis, pyelonephritis) a natural cause of death was certified by an emergency medical doctor.

Due to some money missing form the purse of the deceased as well as the appearance of a serial killer speciallising in old women in the region, the public prosecutor ordered an exhumation. The exhumation was carried out 22 days after the death of the woman. The coffin was burried for 16 days.

The autopsy confirmed the clinical diagnoses as well as an acute pneumonia. No signs of external force could be found. No bleedings in the conjunctivae could be diagnosed. A suffication with a soft cushion could not be absolutly ruled out.

Pictures:

- Preparation of the grave
- The lid of the coffin has already been dug up
- The lifting of the coffin out of the grave
- Side view of the head
- Examination of the left upper conjunctiva

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