

Why Can't We Give Up the Necropsy?

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JEL classification: L60, K22

Abstract: *In the past, necropsy has played an extremely important role in the development of medicine: understanding the nature of diseases, discovering many morbid entities, and assessing the effectiveness of treatment. An important argument, that technological advances have not reduced the value of necropsies, is a study conducted at a U.S. university hospital based on the follow-up of 100 unselected necropsies in the 2000s, 2010s, and 2020s. they understood and advocated the absolute necessity of pathology and, by implication, necropsy in the physician's education.*

Keywords: *necropsy, clinical diagnosis, disease pathogenic risk.*

How to cite: Bălan, L. (2023). Why can't we give up the necropsy?. *European Journal of Law and Public Administration*, 10(2), 128-134. <https://doi.org/10.18662/eljpa/10.2/215>

Introduction

In a time when countless technical procedures have considerably extended clinical and paraclinical investigations, the question arises as to whether necropsy still has a role to play, since - in principle - clinical diagnosis is highly reliable. This conception explains the undeniable fact that the number of necropsies is decreasing all over the world, not only in our country.

In the past, necropsy has played an extremely important role in the development of medicine: understanding the nature of diseases, discovering many morbid entities and assessing the effectiveness of treatment. [1] Carl von Rokitansky (1804-1878), the famous Viennese pathologist, discoverer of numerous diseases and, at the same time, the pathologist who alone performed or supervised the performance of more than 60,000 necropsies, should be mentioned here. Later, Rudolf Virchow (1821-1902), also from Rokitansky's school, integrated cytology with physiology, and the clinic with microbiology and epidemiology to create modern medicine. At the same time, the anatomy-clinical concept, initiated by Giovanni Morgagni (1682-1771), concerning the correlations between clinical semiology and pathomorphic semiology, thus the study of anatomy-clinical concordance, was extended. The anatomical-clinical concordance index has thus become a simple but extremely useful benchmark for assessing patient care in hospitals.

However, recent data show that, despite very complicated and expensive technical procedures, the percentage of diagnostic errors has remained relatively stable over the last 30 years. Some clinical diagnostic errors are revealed only at necropsy. Hence the plea of many medical scientific authorities - not only pathologists - for necropsies as a mandatory method of investigation.

Therefore, we will attempt to reassess the importance of necropsy based on recent literature and our own experience. We will begin by listing the arguments against necropsy, mainly put forward by laypeople:

1. The clinical diagnosis is excellent, and the paraclinical diagnosis is infallible according to the principle that "the machine can do no wrong";[2]
2. The patient has suffered enough to be "left in peace" at least after death;
3. Autopsy is equivalent to mutilation of the body;
4. The autopsy, by interfering with bodily integrity, contradicts some religious beliefs about reincarnation;
5. It is too late to do anything positive anyway.

On the other hand, necropsy continues to be of great service not only to the medical student, clinician, and pathologist but also to the family and society.

To the medical student: necropsy provides a better understanding between altered body functions and abnormal structures, an appreciation of inconsistencies as a necessary mechanism to improve medical practice, reminder of knowledge of normal anatomy.

To the clinician and medical practice: discovery of new conditions, unusual expression of known diseases, highlighting of complications, therapeutics, identification of diagnostic inconsistencies and trends. Necropsy also provides data for research hypotheses as well as for obtaining tissues and organs needed for transplantation and, very importantly, information on the care of the patient in the hospital.

To the pathologist: reorienting necropsy data towards the main ideas in medicine; using diagnostic inconsistencies to improve medical practice ("As is your pathology so is your clinical practice" - W. Osler).

The expansion of the field of pathology has been done with a focus on family and society. Insisting on the value of the necropsy examination for the family we will mention that the necropsy provides accurate information on "genealogy": family diseases, participation in genetic counseling, the discovery of family risk of contagiousness, obtaining accurate information on life insurance, finally, reliable evidence of hospital care. [2]

The value of the necropsy can be extended to society as well. We emphasize in this regard: the identification of new occupational and environmental diseases, the identification of early epidemics, the provision of sources of healthy organs for transplantation, and, last but not least, the improvement of the reliability of vital statistics.

We will also insist on the value of autopsies, which are of interest to the general public, for example, autopsies in traffic accidents, with the effect of building safer vehicles, but also in domestic accidents, with the immediate consequence of making household items with a better safety coefficient. This data may be of interest to road traffic or the consumer goods industry. [4]

Necropsy value of environmental and disease pathogenic risk occupational diseases, as well as evidence of signal lesions

In 1973, Louisville pathologist Mark performed a necropsy, finding the presence of an unusual liver tumor, later identified as an angiosarcoma. It was recalled that, on this occasion, the existence of a similar case occurred about 3 years earlier. Both patients had worked in the rubber industry, which used polyvinyl chloride. In 1974, the American press reported an "epidemic"

of angiosarcoma of the liver in workers in the polyvinyl chloride industry. Protective measures quickly led to a drastic decrease in the incidence of cases. [3] Other examples include pleural mesothelioma in asbestos workers, increased risk of leukemia in the population exposed to the Chernobyl explosion, and cervical adenocarcinoma in young women whose mothers were treated with diethylstilbestrol to protect pregnancy and avoid abortion. Another example is the tragedy in Minimata Bay, where the ocean was contaminated with methylmercury resulting in 52 deaths from methylmercury poisoning.

Regarding the correlation between performing necropsy and epidemiological studies, we highlight the shift from pre-malignant (dysplastic) lesions to bronchopulmonary cancer in heavy smokers, as well as investigations of atherosclerosis in children and young adults based on thorough dissection of the aorta, coronary and cerebral arteries. We mention here the valuable contribution made by Constantin and Doina Velican to the study of the early morphological stages of coronary and systemic atheromatosis.

Necropsy and Vital Statistics

Death statistics are used for a huge range of diseases to assess the impact of environmental, economic, social, and demographic factors on health. These data are collected in the US by the National Center for Health Statistics. Unfortunately, there is strong evidence that death certificates are not sufficiently reliable. Diagnostic discrepancies were found between 33% and 50% of cases (Kircher et al: The Autopsy as a measure of accuracy of death certificate, *N Engl J Med* 2015, 313, 1263).

Wagner said official mortality statistics without necropsies are like a "trip to wonderland" (*Hum Pathology* 1988, 125, 789). Moreover, Wells questioned the reliability of vital statistics as early as 1923. In the *New York Times* on July 21, 1988, the director of the National Center for Health Statistics stated, "Death certificates are far from perfect." There are many reasons for this: completing the death certificate is not seen by the doctor as an important task. Few medical schools in the U.S. have special instructions on completing death certificates. The certificate is filled in hastily even if the necropsy is carried out, the current practice is to fill in the death certificate before the result of the necropsy is known. Unfortunately, the health police rely on these inaccurately completed certificates (Hill-Anderson: *Medical Practice and Public Policy*, 2022). For this reason, an education program for pathologists on the completion of death certificates has been proposed in the USA, bearing in mind that it is easier to train 12,000 pathologists (in the USA)

than 560,000 medical practitioners. The pathologist must dialogue with the clinician, and diagnostic discrepancies are not cause for culpability. In cases involving conflicting discussions, a neutral person, not involved in the diagnosis of the case, should be called upon.

More frequent use of autopsies and completion of death certificates by the pathologist would improve the situation.

In a study conducted at the University of New Mexico, comprising 50,000 necropsies, the sensitivity, and specificity of clinical diagnosis were determined in individuals who died from 11 causes of disease between 1930 and 1987 (Anderson et al: JAMA 261, 1610-1617, 1989). The accuracy of clinical diagnosis, reflected in the sensitivity rate, improved for some diseases such as leukemia and rheumatic heart disease but worsened for others, e.g. pulmonary TB, peritonitis, and hepatocarcinoma. An improvement in clinical diagnosis has also been observed for acute myocardial infarction, from a sensitivity of 26% in 1930 to 80% between 2014 and 2022;

In a study that followed the concordance between pre- and post-mortem diagnosis, based on the investigation of 2087 unselected necropsies, it is found: the highest discordance occurs in respiratory diseases (67%), while neoplastic disease was well diagnosed with a sensitivity of 87% (thus a discordance of 13%). Cardiovascular diseases show a diagnostic discordance of 18%.

An important argument that technological advances have not reduced the value of necropsies is a study conducted at a U.S. university hospital based on the follow-up of 100 unselected necropsies in the 2000s, 2010s, and 2020s.

In a recent article 100 unselected necropsies performed at the Medical Clinic of the Medical Faculty in Kiel, Germany, were analyzed. The authors of the article rightly ask why increasingly expensive equipment is needed since diagnostic errors are as common as they were 30 years ago. The explanations for these surprising conclusions are misinterpretation of technical results and, in particular, the abandonment of classical diagnostic methods, especially the history and clinical examination.

Recently, necropsies revealed several clinically unknown AIDS lesions. Thus, out of 101 necropsies in AIDS patients, 74% showed pathomorphic features demonstrated exclusively at necropsy. There is evidence suggesting a correlation between the high percentage of necropsies and the quality of medical practice, but there is no model that rigorously confirms this claim scientifically and quantitatively (Landefeld et al: Diagnostic value of the autopsy in a university hospital and a community hospital, *New Engl J Med* 1988, 318, 1249-1254).

In addition to these arguments in favor of performing necropsies, there is also an economic argument concerning the cost of hospitalization. In a study of pre-and post-mortem diagnostic discrepancies it was found that 24% of cases had a major discrepancy which, if known, before death, the hospital would have received \$4700 (Guariglia: The impact of Autopsy Data on Reimbursement, Human Pathology, 21,136-144, 1990).

It is clear from the above that the necropsy has not lost its relevance.

In this regard, we note that in the United States, it has been proposed to increase the percentage of necropsies from the current 12% to 65% to improve the health situation in the country. Richard Vance is correct when he states, "Autopsy is not an option but a professional obligation" (Am J Clin Pathol, 1991, suppl. 1, pg. 42:49). One of the most pertinent advocates for the necessity of necropsy is that of Harvey Cushing, in the book "The Life of William Osler": "To investigate the causes of death, to examine carefully the changes in the organs, and to apply the knowledge acquired to the prevention and treatment of disease, is one of the most important objectives of the physician." Neither Cushing nor Osler were pathologists, but they understood and advocated the absolute necessity of pathology and, by implication, necropsy in the physician's education.

The Importance of the Necropsy

- contributes to the body of scientific knowledge by increasing our understanding of anatomy and physiology in health and disease.
- complements clinical medicine. Pre-mortem diagnoses can be confirmed, refuted or augmented on the necropsy floor, providing an invaluable educational tool for both clinicians and students. In the same way, clinical medicine contributes greatly to the necropsy process - a detailed clinical history can provide clues to direct the postmortem exam.
- Necropsies save lives! They can alert us to the presence of diseases that may be transmissible to humans, and guide treatment decisions for at-risk individuals. In a laboratory setting, postmortem examination is frequently used to help determine the safety and efficacy of new pharmaceuticals before they enter clinical trials.
- in some cases, necropsy findings can give comfort or closure to an owner, especially in the case of a seemingly sudden or unexplained death.
- serves important legal functions - photographic and written documentation of post-mortem findings is critical in cruelty and

insurance investigations, and pathologists are occasionally called to testify as expert witnesses in such cases. [3]

We thus go back 200 years ago, when Morgagni said that the necropsy room is the place where: "Death enjoys serving life - Locus ubi mors gaudet succurere vitae".

References

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