ETHICAL AND PRACTICAL IMPLICATIONS OF AUTOPSY EXAMINATION

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Abstract
Autopsy (necropsy, postmortem examination, autopsy cadaverum) is often marginalized in contemporary medicine, although it remains an important practice with enormous potential to move forwards new medical information and develop clinical practice. Many doctors are not common with autopsy examination and are not sufficiently conscious of the benefits of this procedure not only for the families involved, but also for patients. Standard autopsy should ideally be an critical part of investigating foetal loss, newborn deaths and neonatal deaths without foetal malformations. In many countries where family approval is required, it has been recently recorded a decrease in the number of autopsies. Clinicians and other family doctors requiring family consent for autopsy should consider in advance the options for a full, limited, or step by step post-mortem examination; the problem of tissue sampling and the autopsy value, as well as the possibility that the information obtained has a real benefit for themselves should also be iterated. However, this type of information must be provided in compliance with personal and cultural values of the involved families. Therefore, the role and usefulness of autopsy will be reflected in their public support, and only when the new generation of physicians will realize the importance of the knowledge gained from examining the human body after death, the importance of necropsy for current medicine will be understood.

Keywords: necropsy, ethics, adult, child.

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Introduction

First writings on autopsy are closely related to some anatomical descriptions that belong to the Egyptians. Manetho Athotis, the king-physician, is the first historian who mentions these matters (about 4000 BC), although most researchers believe that early anatomical descriptions come mainly from observations made by hunters and butchers on animals [1]. Erasistratus and Herophilus of Chalcedon, who lived in 3rd century BC in Alexandria, had significant experience in conducting autopsies, although generally it was a rare procedure in Ancient Greece [2].

Dissection for medical reasons continued to be practiced after the Romans in various societies, but modern autopsy process belongs to Giovanni Morgagni (1682-1771), considered the father of pathological anatomy, who wrote the first comprehensive study of pathology entitled De Sedibus et Causis Morborum on Anatomen Indagatis in 1769 [3]. In the XIX-th century, the well-known researcher Rudolf Virchow, in response to the lack of standardization of autopsy procedures, established and published specific protocols. In addition to standardizing post mortem dissection procedures, the first half of the XX-th century brings improvements in tissue sampling, microtomy and histochemistry. In North America, Sir William Osler (1849-1919), considered the father of modern medicine, highlighted the importance of autopsy in medical education (undergraduate and graduate level), being permanently interested in this subject along his career [4]. In recent years, the number of autopsies performed in hospitals has been continuously decreased - a fact that triggered some negative feedback, considering that when death occurs due to an error, this is not investigated and therefore it may be repeated. [5], [6], [7]. However, autopsy has an important place in medicine and in society, as reflected by the numerous symposia, journals and books focusing on this subject. Its supporters give emphasis to its role in increasing public confidence in medicine, while its opponents argue about the risks and autopsy cost-effectiveness relation. For others, the autopsy does not require any justification, as it is an essential point in acquiring medical knowledge. Beyond these differences, most agree that the benefits of autopsy for clinicians, patients and society demonstrate its value [8].

Motivation and utility of autopsy

An autopsy, also called necropsy, postmortem examination, autopsy cadaverum, is a surgical medical act which consists of a systematic examination of the tissues and organs of a cadaver in order to determine the cause of death and the manner it was produced [9]. In this context, depending on its medical or legal intention, it is necessary to distinguish between anatomo-pathological or prosectural autopsy and medico-legal autopsy, which are different in terms of purpose and legal management.

Anatomo-pathological autopsy pursues the corroboration, explanation and completion of clinical diagnosis. Moreover, performing the autopsy for the purpose of scientific research enables the understanding of a pathogenesis mechanism specific to particular diseases. In view of these positive aspects, it is a question why
the number of prosectural autopsies shows a continuous decline over recent years, especially in countries where autopsies are conditioned by family consent [5], [6], [7].

**Medico-legal or forensic autopsy** is a procedure performed at particular request of judicial authorities in some cases clearly specified by law (violent deaths, suspicious deaths, deaths of unknown cause) in order to determine the cause and manner of death and also the legal implications related to the manner of death [10]. Medico-legal autopsy is undeniably an absolute social necessity by its important contribution in the way of justice. Often, this teleological approach diminishes the value of autopsy for the family of the deceased [11]. Therefore, during autopsy, it is particularly important for the pathologist to obtain information about hereditary or contagious diseases, which may provide a basis for genetic counselling or may indicate preventive treatments for the relatives. In a large study of deaths during the perinatal period, Faye-Petersen and colleagues [12] determined the precise cause of foetal or perinatal death in 94% of cases, and more than that, autopsy conclusions changed the estimations of recurrence risk and genetic counselling in 26% of cases. Reporting cause of death also helps taking away the responsibility of the family which can be considered responsible of death, especially in sudden death cases [13]. The autopsy contributes to an enhanced management of public health by detecting contagious diseases; it helps to identify environmental hazards and to produce relevant statistics for understanding the complexity of contemporary challenges which medicine must face. Furthermore, an autopsy may help to identify early bioterrorism. In this respect, from 2000, in New Mexico was created an Office of Medical Examinations which established a model for surveillance of bioterrorism and mortality from infectious diseases ("Med-X"). They used a set of symptoms helpful to determine the cases that should be autopsied and also a set of pathological syndromes for early reporting of public health cases to the authorities. The model showed that many of the symptoms had a high predictive value for infectious diseases and were useful criteria in performing an autopsy. A guideline to implement medical surveillance for fatal infectious diseases and bioterrorism shows that involved microorganisms were identified in a significant percentage of 81%, and 58% of these were of great interest to public health [14]. Most medical students, pathology residents, doctors and nurses agree on the usefulness of autopsy in medical and educational practice, although its educational value is not fully accepted. An autopsy has clear benefits for medical students education, being at the same time very helpful for those who study various disciplines related to health, mainly by supplying appropriate teaching materials. The effective participation in autopsy provides not only information of pathology, but also of anatomy, thus enabling the integration and correlation of basic medical knowledge with the clinical one. Both prosectural and forensic autopsy are practiced within higher education institutions for teaching purposes, contributing to the instruction of future professionals in the fields of health and law [15]. Although the number of autopsies is decreasing [16], [17], the gathered data...
continue to enrich the medical literature regarding cardiovascular, respiratory, oncology or haematology diseases [18]. Current molecular techniques, added to post-mortem examinations have identified diseases related to various infectious agents. Between 1950 and 1988, Hill and Anderson performed extensive studies which led to identification of 87 undiagnosed diseases or clarified their pathogenic mechanism [19]. The autopsy also offers normal and pathological human tissues for research directed to cultures of cells and organs, xenotransplantation, biochemical analysis and morphological studies. To highlight once again the usefulness of the autopsy, it must be pointed out that cooperation between pathologists, clinicians and patients families, often provides opportunities for donation of organs or tissues shortly after death [20], [21]. However, many religions, such as Judaism and Islam, discourage autopsy [22], keeping a highly dynamic debate on its social and cultural implications. Forensic autopsy is a key component of criminal investigation as it provides useful information regarding the cause of death and sometimes establishes the identity of the deceased. A forensic autopsy is frequently performed in cases of sudden death or when death from unnatural causes is suspected. These examinations are performed under legal authority and do not require the consent of relatives of the deceased. Examples are the victims of murders, when forensic doctors search for signs indicating the manner of death (wounds, strangulation marks or traces of poison, etc).

Legal, social and ethical issues
The announcement of the death to the patient's family is clearly one of the difficult tasks of the medical staff. The hospital pathologist is unlikely to do it, but the clinician would surely be the one who announces the family in case that death occurs at the hospital. In suspect cases of murder, investigators make an initial notification, although the medical staff may inform the relatives arriving at the scene or at the hospital.

Autopsy authorization
Autopsy authorization laws vary from state to state. In clinical practice, policy or compliance procedures are established in accordance with the relevant laws in the region. In the U.S. for example, human remains enter in the possession or custody of a relative who has the duty to organize the funeral service. The custodian may authorize an autopsy, decide organs donation or whole body donation for therapeutic or educational purposes or follow a proper legal status, embalming, burial or cremation. Also, a relative may place restrictions on whether and how to perform a morgue autopsy; this no longer applies to forensic autopsy.

Patient confidentiality
Medical institutions and employees should protect the patient's right to privacy and confidentiality, unless specified by the law [23], [24], [25]. Exceptions may occur in case of communicable diseases because the doctor has the legal or ethical obligation to notify public health authorities, to warn third parties, such as sexual partners or other close
contacts, advise the medical staff involved in patient care and alert others who may have contact with infected tissues or fluids.

**Tissue and organ donation**

In the past, Americans could donate pituitary glands removed at autopsy in order to extract human growth hormone for therapeutic use [26], [27]. Although DNA recombination technology resulted in waiver of such processes, other human tissues obtained after autopsy are used in transplant and reconstructive surgery [21]. Tissue and organ donation usually involves the pathologist only in terms of cooperation. In cases where there is consent for both autopsy and organ donation, viable organ harvesting must occur before any post-mortem examination. An exception to this process happens in medico-legal cases where the forensic doctor must determine whether organ donation could interfere with a medico-legal (forensic) examination.

**Request of human tissues for research**

Human tissues requests are addressed to pathologists, in particular to those affiliated to research institutions. They must ensure that they received appropriate informed consent and an official authorization from the appropriate regulatory commission. All these approvals certify privacy and confidentiality of patient and family [21], [23].

**Obligations of the pathologist conducting the autopsy**

The pathologist assumes certain moral responsibilities; he/she must always perform autopsies with the necessary respect for the deceased, for their relatives and for the clinicians who followed the case. In countries where family consent for autopsy is compulsory, he/she must assess the validity of this agreement as the permission obtained through deception or coercion is morally invalid. In Romania, for example, legislation provides that morgue autopsy is performed for all deaths occurring in hospital, and the family may claim exemption from autopsy. Pathologist's professional obligation is to perform a competent post-mortem examination and to report the autopsy results accurately and promptly [9]. Pediatric autopsy must be approached with great care because some abnormalities may be easily overlooked by the uninitiated. An accurate diagnosis has a major importance in pediatric pathology in order to provide genetic counselling and know whether disease recurrence in future pregnancies is possible. Although the number of autopsies in adults has declined in recent years, the importance and demand of pediatric autopsies has increased; these are of great significance in foetal and perinatal pathology than for any other age. These features are mostly related to birth defects and genetic counselling. Detailed description of all abnormalities in deceased foetuses, infants and young children is of paramount importance, completed by cytogenetic, metabolic, DNA studies and other tests. Also the harmful effects of the environment which are evident during the development stages in the foetus and newborn must be pursued. Thus, any new environmental danger, drugs, including chemicals, radioactive materials, alcohol or intrauterine infections are best
evaluated by specific sampling of tissues and organs from foetuses and newborns during an autopsy. Performing a careful perinatal autopsy followed by the report of findings to the parents, doctors and public health organizations is important in reducing perinatal mortality and morbidity. Knowing these indicators is extremely important because they reflect the standards of living in a society. Neonatal autopsies help us in understanding diseases occurring in newborns and they also are an excellent monitoring factor of the treatment outcomes. Perinatology development, prenatal diagnosis of congenital malformations and genetic counselling require accurate prenatal diagnostic techniques, including ultrasound and correlation of clinical data with the results of foetal autopsies. The corroboration of the above issues is reflected in an accurate diagnosis after autopsy, essential for an intelligent family planning. Autopsy examination is the basis on which a comprehensive perinatal autopsy is built. Besides the tissues obtained and examined by autopsy we need further studies and techniques to develop an accurate diagnosis: microbiological, cytogenetic, imaging, enzymatic examination or DNA analysis. At present, in many countries autopsies in children and adolescents are more requested than in adults because parents want more information about their child's death and want to identify possible implications of death causes on future pregnancies [28], [29]. In Romania, “The law on handling human corpses and harvesting of organs and tissues from cadavers for transplantation” clearly states that, “Anatomopathological autopsy is compulsory in all hospital deaths which are not forensic cases and which require the confirmation, clarification or completion of clinical diagnosis, including deaths of children under one year, regardless of the place of death and maternal deaths which are not forensic cases "[21]. Regarding patients with known chronic diseases, if carers require, the autopsy would not be performed. Various tests can be performed from the embryo stage to any stage of childhood; a clear information necessary to educate families about future pregnancies is obtained when this data are combined with clinical data. Normal anatomy of the adult and child are essentially similar; however, perinatal autopsy and infants autopsy are significantly different. The variety and complexity of congenital abnormalities found in perinatal and foetal autopsies is overwhelming; the pathologist must be prepared to spend the exact time to describe these abnormalities. Most abnormalities found in this category of population do not allow survival to adulthood. A complete examination cannot be performed without important clinical information. In pediatric autopsy, necessary authorizations must be obtained and properly signed before autopsy. Special dissections, such as eye removal, require special permission. A complete family history, and especially information about other perinatal deaths, is very important. Ultrasound scans and X-rays, including studies of previous pregnancies with or without foetal death can be extremely useful. If the child was hospitalized, a discussion with the clinician is required, as this would allow a more targeted autopsy in some cases. In medical research, the benefits of autopsy are certain, as they confirm, bring new information or deny clinical
diagnosis, provide feedback and education, facilitate the investigation of diseases determined by occupational environment and lifestyle, improve accuracy and usefulness of biostatistics, provide organs for different studies, identify rare diseases, allow the evaluation of new diagnostic and therapeutic techniques, provide epidemiological data and new information on disease manifestations. From legal perspective, autopsy allows monitoring of public health, explains sudden deaths or may clarify issues that could lead to malpractice lawsuits. For families, autopsy identifies infectious diseases, hereditary diseases, offers assistance in genetic counselling, and represents a way to donate organs. Medical ethics of the new millennium will be fascinating and with major implications for our society.

In the public sector, such as hospitals and other health care organizations, ethics cannot completely transcend politics because the public sector is an important part of the political arena. However, for the ethical guidelines to survive, they must be based not on political expediency but on sound ethical principles. Challenges related to regulation, policy and ethical issues in hospital or other healthcare sectors should be the concern of the health care staff in the near future because ethical decisions are ubiquitous in medical practice, both in the patient-physician relationship and at the macro level of resource allocation and of other ethical decisions [30].

Another important aspect which must be underlined lies in the impact of modern technology on this field. On one hand, it constitutes an extremely important contribution to the improvement of knowledge and medical practice. The virtopsy technique, for example, is devoted to the implementation of modern imaging techniques in forensic medicine and pathology, in order to improve current examination techniques or to provide alternative methods. This procedure is an option in cases where autopsy is rejected by family members or out of religious reasons. Forensic findings could be presented in some cases to prosecutors and courts in tridimensional images without bloody images [31], [32]. On the other hand, the potential negative impact that technology can generate is less discussed. For younger generations of doctors virtual reality seems to replace the real medium in building analytical models and thus a cleavage between the particularities of each case and technological standardization can be generated. Every day, health professionals deal with the complex realities of the activities they carry out and with the ethical implications arising there from. Each patient has a unique set of problems requiring prompt action, moral reflection and reassessment, and each diagnosis requires collective knowledge and notions of actual care of a medical team. Moreover, every medical dilemma reminds those involved of limitations, including uncertainty, lack of knowledge and decision-making skills. All these are tempered by the moral constraints under which they act. Health professionals must accept the reality, namely that sometimes tragic cases have tragic results. Those involved must direct their actions in order to define goals related to their specialty, but realistically customized for each patient. The objectives of each patient's care should be consistent with
professional goals, social norms, institutional mission and, not least, with parents’ or family expectations. This requires time and deep reflection while communicating with families, and advocates for the patient’s benefit.

Conclusions

Autopsy provides an important assessment of most systems of organs and identifies the pathological processes responsible for most diseases leading to death. In some cases, simple post-mortem dissections can complement or enormously enhance the pathological correlations; therefore, a modern pathologist should be highly trained to manage these aspects.

Legal authorities use the autopsy to investigate causes of death, and medical schools follow - through the dissection of a cadaver - the acquisition of anatomical knowledge by students.

Despite the decline in the number of autopsies in recent years, this procedure remains the gold standard in correlating clinical data with diagnosis of death, while the establishment of the causes of mortality and morbidity are essential elements to the substantiation of future health policies in a society.

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