The Importance of Histological Examination in Forensic Medical Practice

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Abstract

Background: Histopathological examination plays a significant role in the precise determination of the cause of death. Death scene investigation, full medical history of the patient, thoroughly performed macroscopic exploration of the bodyand its internal organs, supported by the results from a microscopic histological examination of the tissues, determine the forensic medical autopsy standards. These, as well as the skills and the experience of the forensic medical expert, guarantee an accurate forensic medical diagnosis for the medico-legal needs.

Methods: In order to sustain our preposition, we present a case from our practice. A man died during a hospital treatment for anemia and an autopsy, requested by the relatives, was performed. It was concluded that the cause of death was a hypostatic pneumonia. During the autopsy a histological material was taken but no examination was made. Months later, following a prosecutor's order a histological examination was performed and evidence for a disseminated intravascular coagulation was found.

Conclusion: This is one of many cases in which there is a difference between the macroscopic and the histological diagnosis. Histopathological examination of the internal organs for the purpose of providing a medical cause of death is essential for the forensic practice and it should be undertaken whenever there is a doubt in the macroscopic diagnosis.

Key words: *Histological examination, forensic histopathology, forensic medicine, forensic medical practice, autopsy, disseminated intravascular coagulation, pneumonia*

Introduction

Nowadays, forensic medical practice differs in countries around the world. There are no uniform standards of professional forensic practice. Forensic histopathology is the application of histological techniques and evaluation to forensic pathology practice.[1] The histopathological examination of samplings of human tissue following medico-legal post-mortem autopsies is not mandatory and forensic experts only perform it under certain circumstances. Good medical practice is taking tissue samples in most cases for a future examination if ordered by the authorities. The value of routine post-mortem histological examinations raises questions in regard to forensic practice and its ability to provide the cause and manner of death. Most of the time the forensic medical expert determines the cause of death only by a macroscopic exploration of the corpse, especially in cases of severe traumatic lesions and after familiarizing himself with the death scene protocol and the medical history of the patient. In these cases, the histological examination could be useful only for the confirmation of the macroscopic findings and

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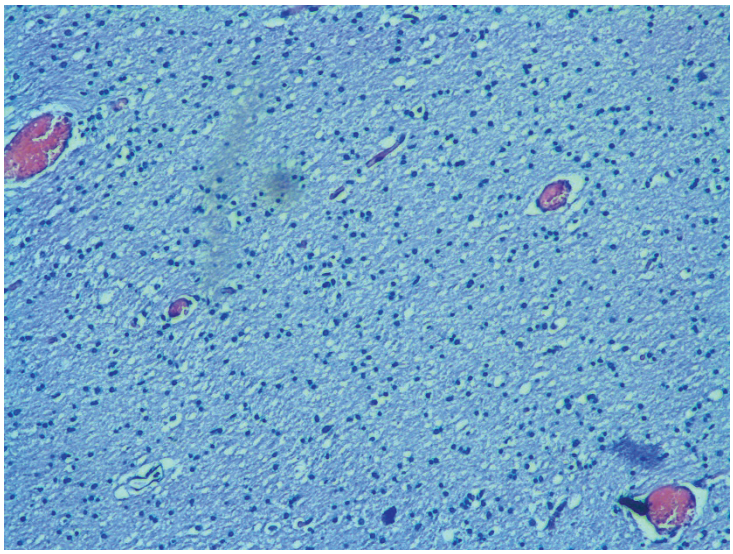
hence why it is seldom performed.[2,3] Nevertheless, in cases of a sudden death or whenever there is uncertainty for the accurate forensic diagnosis, the histological examination should be undertaken for a precise determination of the cause.[4]This would significantly reduce the possibility of forensic medical malpractice.

Materials and Methods. Case Report

A 54-year-old man was hospitalized for treatment of anemia.His medical history included an unspecified anemia, ulcerative colitis, esophageal candidiasis, hemorrhoids, hepatic steatosis, and chronic gastritis. During his hospital treatment, he attempted suicide by taking a large amount of a medication. After a psychiatric evaluation, it was concluded that the patient suffers from a psychoorganic syndrome. Following the suicide attempt, the patient could not be released from the hospital without an attendant, which he did not have at that time. After a month and a half stay in the hospital, he suddenly died. An autopsy, requested by the relatives, was performed 15 days after his death. The external examination determined an absence of rigor mortis. There were fixed purplish-red post-mortem patches on the posterior uncompressed surfaces of the body. The skin was pale. No visible traumatic injuries were established. The upper and lower limbs were swollen. There were decubitus ulcers from prolonged pressure on the skin covering hips and tailbone. The internal examination revealed a severe bilateral confluent pneumonia with a bilateral pneumothoraxand fibrinous pleuritis. A material for histological processing was collectedbut no examination was performed. It was concluded by the macroscopic findings that the cause of death was a hypostatic pneumonia resulting from a continuous horizontal position on the hospital bed. Two days before the patient's death, a roentgenological examination was made with non-specific imaging data for a development of the pneumonic process. Months later, following a prosecutor's order, a forensic medical expertise and a histological examination were requested.

Results and Discussion

The histopathological examination of samples from the internal organs revealed evidence for a disseminated intravascular coagulation in materials from brain, lungs, and myocardium. The histological examination of the lungs determined circulatory changes in the alveoli, interstitial and intraalveolar edema, 'sludge' phenomenon, atelectasis areas, aged focal inflammatory changes, compensatory emphysema, area of recent hemorrhagic infarction,and a disseminated intravascular coagulation. It was concluded by the histological findings that the cause of death was the disseminated intravascular coagulation and the hemorrhagic infarction of the lung, resulting in multiple organ failure. There was a difference between the macroscopic diagnosis and the microscopic one. The forensic medical expert did not examinate the histological samples from the autopsy and incorrectly assumed the pneumonic changes were the cause of death. Not finding the hemorrhagic infarction of the lung was also an omission.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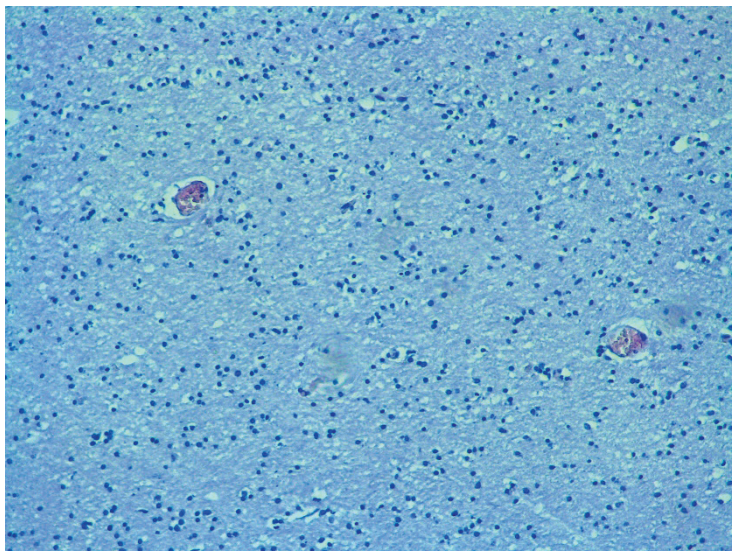
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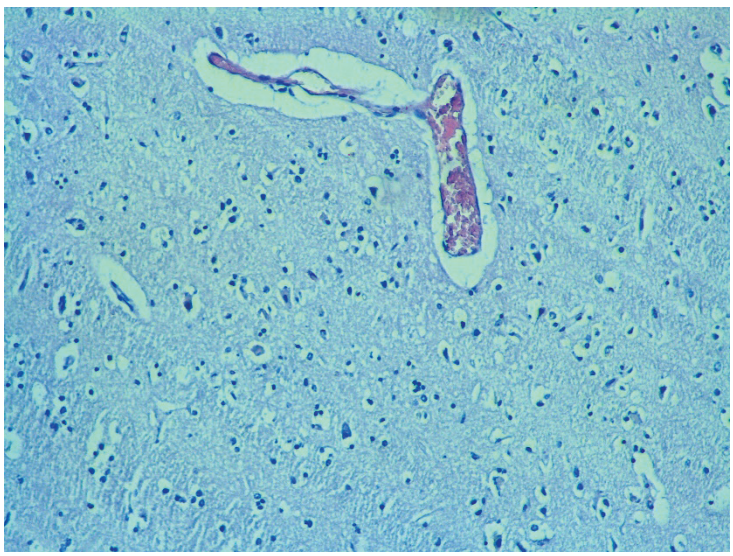
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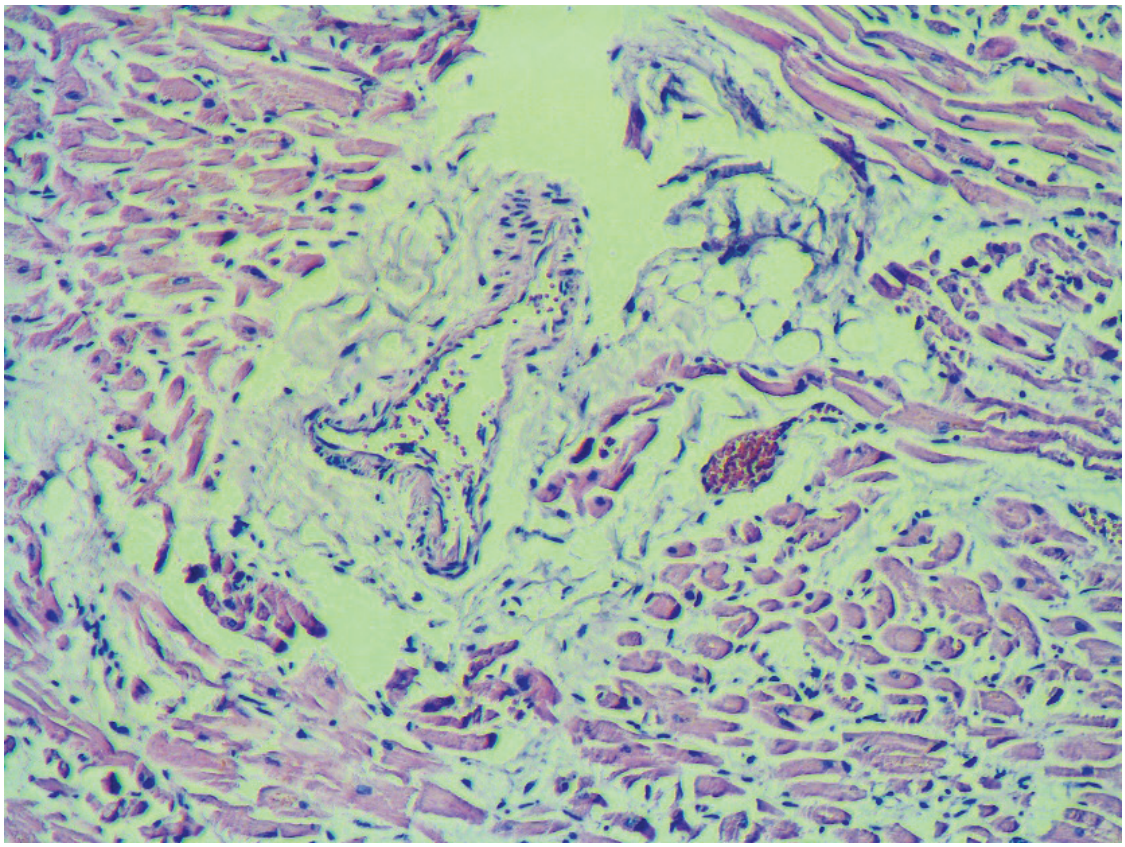
Figure 1. Disseminated intravascular coagulation in brain sample (a., b., c.)



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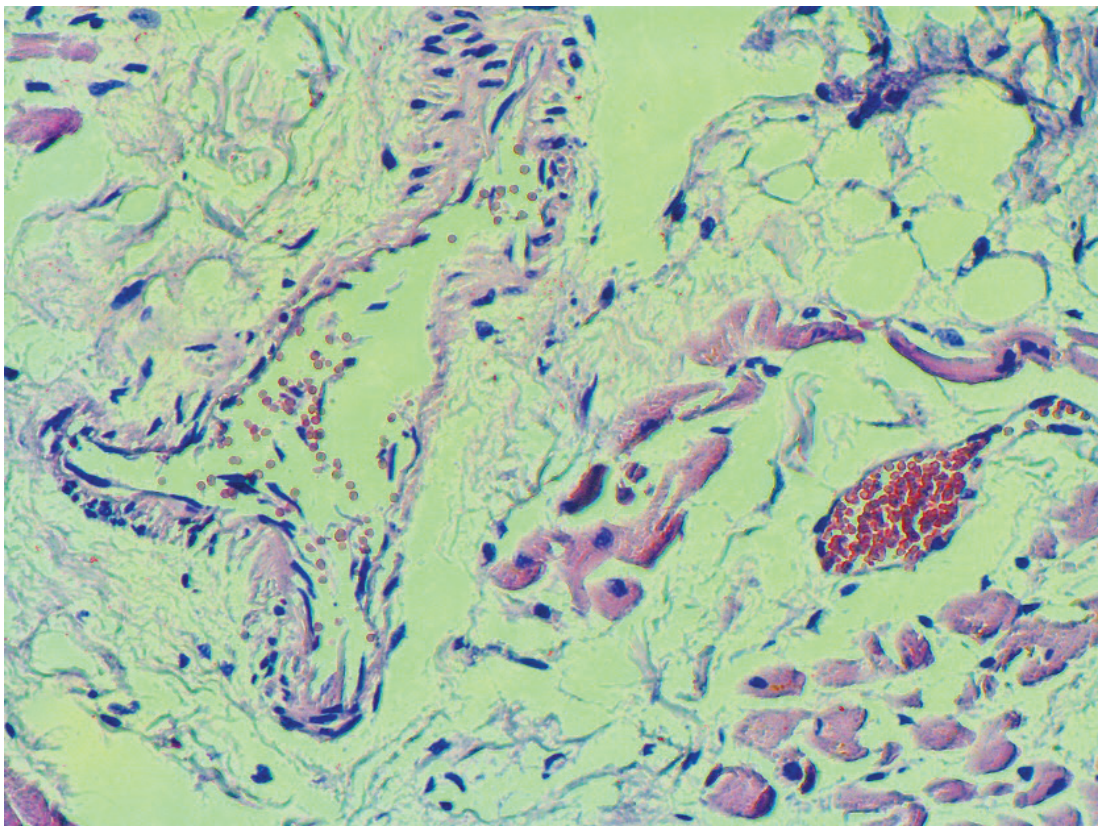

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Figure 2. Disseminated intravascular coagulation in myocardium sample (a., b.)

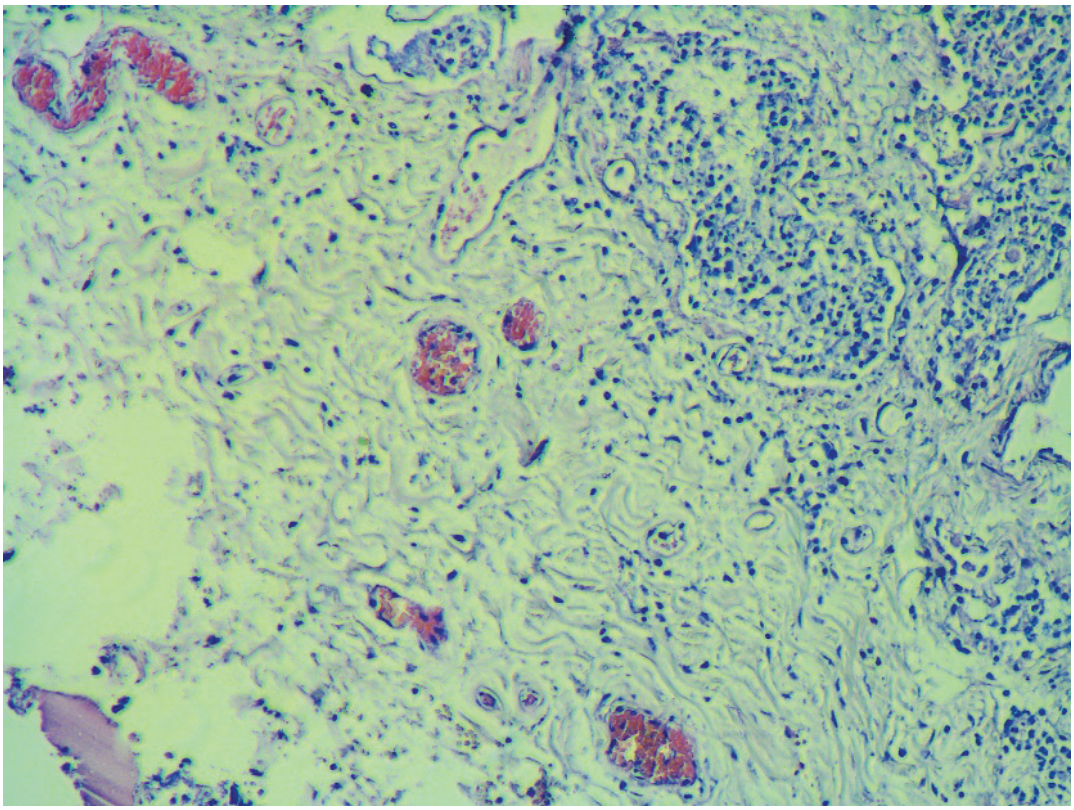


Figure 3. Disseminated intravascular coagulation in lung sample

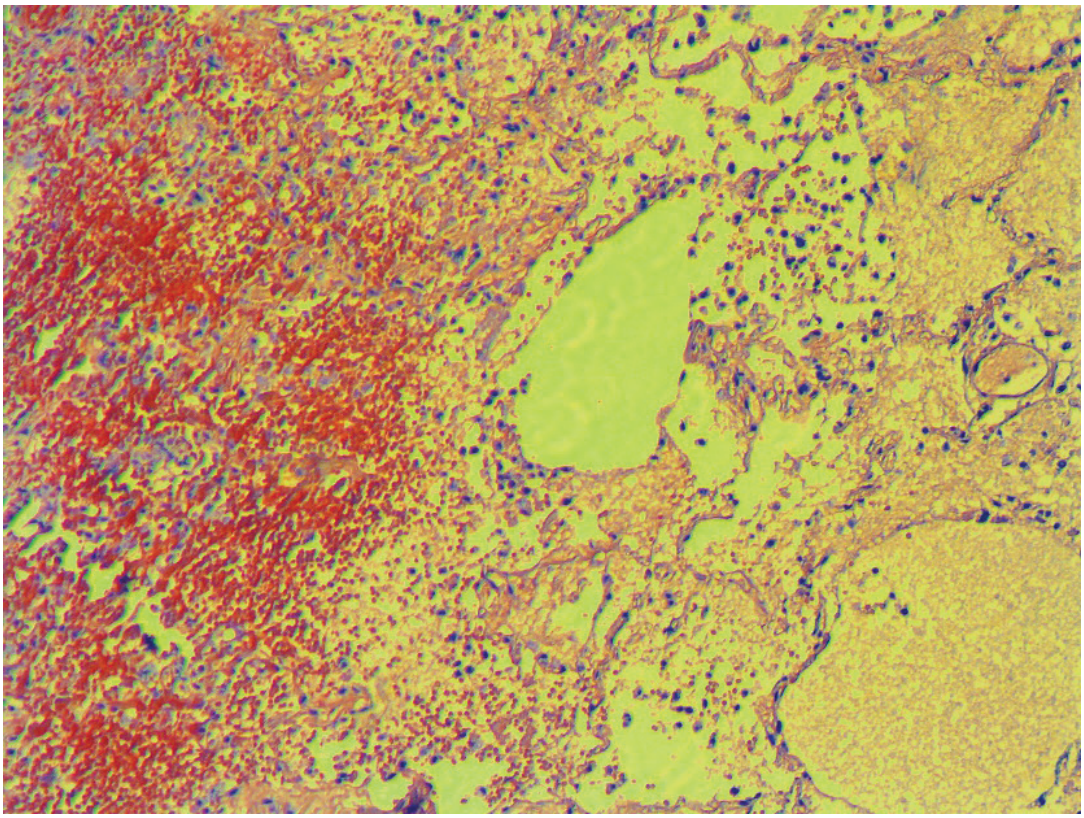
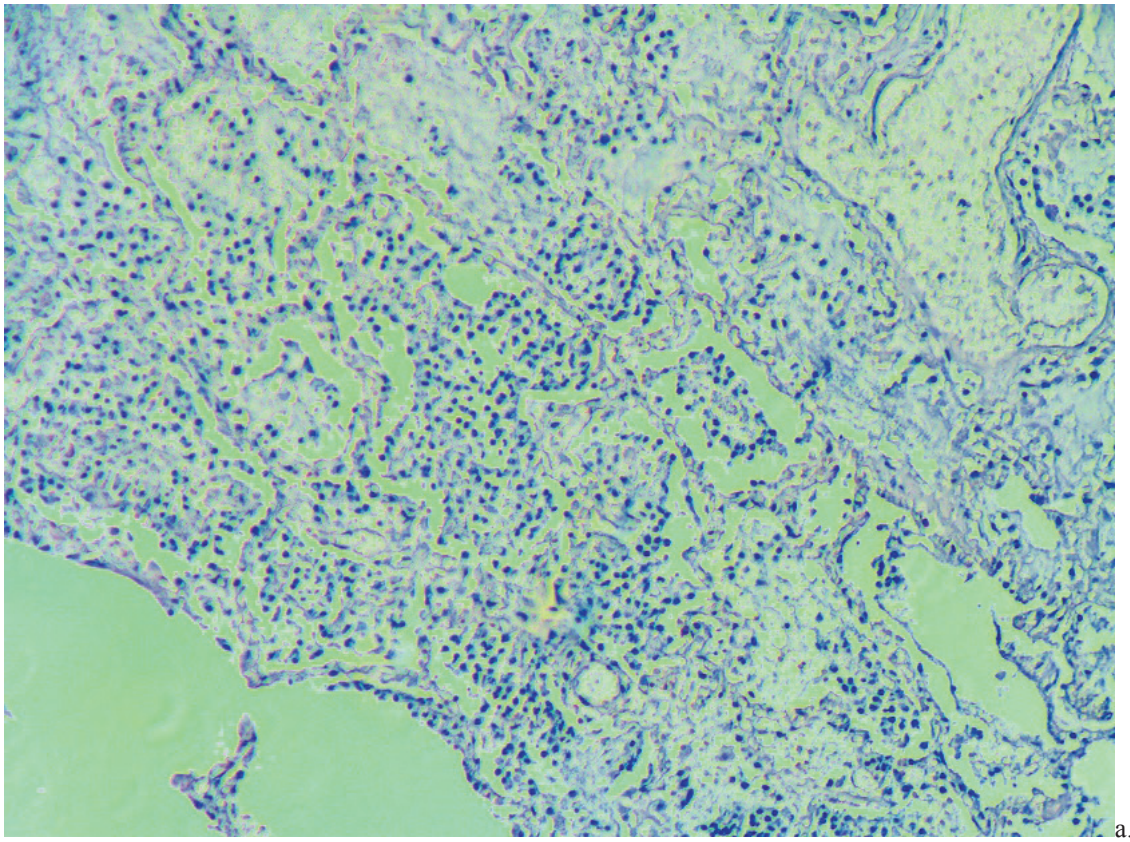


Figure 4. Hemorrhagic infarction in lung sample



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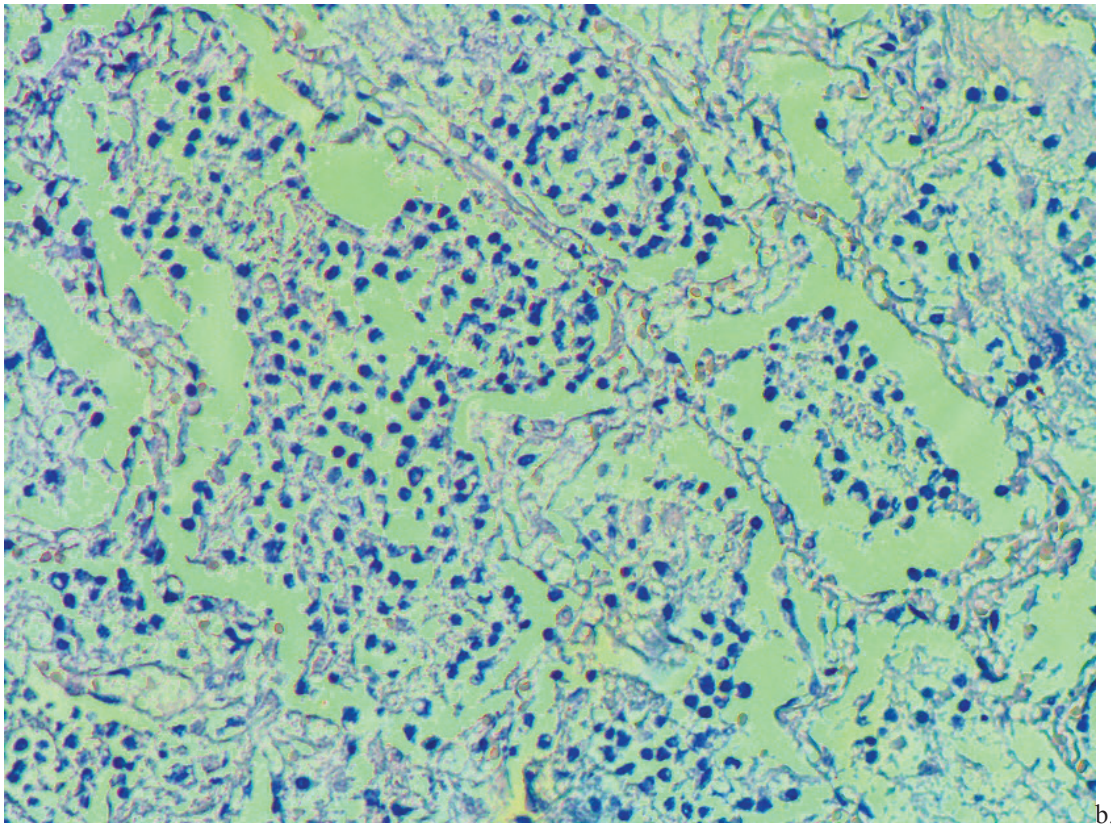

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Figure 5. Aged focal inflammatory changes in lung samples incorrectly assumed as a present pneumonia (a., b.)

Medico-legal or forensic medical autopsies are performed at the behest and per the instructions of the legal authorities in cases of sudden, uncertain, suspicious, or criminal death. The primary goal usually is to determine the cause and manner of death. The forensic physician should be familiarized with the death scene protocol and supposed circumstances surrounding the death, and medical history of the patient. A post-mortem medical examination (autopsy) should be performed on the external and the internal part of the body. Blood and toxicology analysis should be done if necessary.[5]The forensic autopsy differs in purpose and in procedure from the pathological or so-called hospital autopsy. The histological examination is more often performed in pathological autopsies rather than the medico-legal ones.[6] Taking tissue samples for additional evaluation, their proper storage, preparation, and examination are a mandatory part of the forensic practice. This has been regulated in the 'Harmonization of Medico-Legal Autopsy Rules' protocol, adopted in 1999 by the Committee of Ministers of the member states of the European Union. It is required especially in cases of a sudden death, death occurred under unusual circumstances or death in a hospital setting.

Conclusion

Regularly, the histopathology is used to aid in the diagnosis and confirm or refute the macroscopic findings. There are differences in autopsy practice between each country so there is a variable rate of handling the histopathology in determining the cause of death.[7] Taking samples and performing a routine microscopic examination more often should be considered in the forensic medical practice. Death scene investigation and properly performed autopsy carried out by an experienced forensic physician is not always sufficient to establish the cause of death. Furthermore, in some cases histopathological examination is an essential method to conclude an accurate forensic diagnosis. This ensures a good forensic medical practice for the medico-legal needs.

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Conflict of Interest: The authors declare that they have no conflict of interest.

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Ethical Clearance: Taken from the Ethical Committeeof Multifunctional Hospital for Active Treatment 'Losenetz', Sofia, Bulgaria.

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