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About a Case of Anomalous Evolution of the Thanatological Phenomena

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ABSTRACT

The reported case is worthy of reporting because it shows the difficulties encountered in the medico-legal practice in determining of the death time. The Authors highlight the influence of the environmental factors on the thanatological processes and the importance of studying the climatic and microclimate conditions of the environment where the corpse is found. The thanatological phenomena, detected during the crime scene investigation, placed the death time 48-72 hours before the corpse was discovered, while the investigations of the Judicial Police assessed the murder was committed a week before. The anomalous development of the thanatological phenomena was explained as the consequence of the microclimatic conditions, which significantly slowed down the evolution of post-mortal processes, bringing the time of death to a time antecedent to that established. It can be asserted that the earlier the thanatological data are collected in relation to the time of death, the greater is the likelihood of the death time estimate to be correct, as the influence of the environmental factors is reduced.

Keywords: *postmortem interval, consecutive phenomena, environmental factors, Henssge nomogram, thanatocronology.*

INTRODUCTION

The chronology of the thanatological phenomena has an irregular and never constant pattern due to the variability and multiplicity of influential factors that can be distinguished in "extrinsic factors" to the corpse, such as temperature, humidity, ventilation of places or season, and "intrinsic factors", such as complexion, the cause of death, age or the presence of pathologies. In this report we describe a directly observed case where consecutive thanatological phenomena occurring on a corpse found within a home presented an abnormal chronological trend due to the particular microclimatic conditions that

had been created, underlining the difficulties that can be encountered in the legal practice in establishing the time of death.

Case Report: In February 2013, in late morning, in a Roman coastal location, a corpse of a 65-70 years old male subject was found inside a house. The site inspection started, and before entering inside the house, the outdoor temperature was detected, which was 13.5 °C. The dead body, which was devoid of clothes, was found in a prone position inside the house. Before examining the body, the temperature was measured inside the room where the body laid. It was 15.1 °C. The cadaveric temperature, measured at regular intervals of 30 minutes for two hours by rectal thermometer, was consistently 15.7 °C. The hypostatic spots were of a reddish color, abundantly represented and located in the anterior regions of the body, at the initial phase of absolute fixation, as they were just attenuated by a energetic prolonged massage and no longer migratable to body displacement. The cadaveric rigidity was in process of resolution. Finally,

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there was no apparent transformative phenomenology; in particular, there was no putrefactive green spot. The preliminary inspection of the corpse showed numerous injuries of different nature: lacerated and contused wounds of the head, face ecchymosis, skin lesion at the neck due to strangulation and stab, and puncture and stab wounds to the limbs and trunk posteriorly and laterally. The thanatological phenomena observed during the inspection determined that the time of death was about 48 to 72 hours before the corpse discovery. Henssge's nomogram, knowing the rectal temperature (15.7 °C), environmental temperature (15.1 °C) and body weight (80 kg), and considering the corrective factors, confirmed the time of death of estimated during the inspection. However, this information was refuted by the investigations of the Judicial Police. In fact, a video surveillance system near the house where the corpse had been found, filmed the murderer and the victim while returning home with the car of the latter the week before. After a few hours, the murderer left the victim's house with the same car without returning. In the week before the discovery of the corpse, nobody came or left the house. This investigative finding, therefore, allowed the age of death to be fixed a week before the corpse was discovered.

DISCUSSION

The reported case is characterized by an abnormal and singular trend of the thanatological phenomena, which have made the determination of the time of death extremely difficult and complicated. As far as the examination of the time of death is concerned, the following is to be specified. Cadaveric cooling, in standard conditions, occurs in the first 3-4 hours of death with a half-degree decrease in temperature per hour; then in the next 6-10 hours there is a decrease of about one degree per hour and after approximately 14 hours from death, the cadaveric temperature decreases initially three-quarters of degree, then half-degree and finally a quarter degree per hour till it equals the environmental temperature. Temperature leveling occurs on average from 24 to 30 hours. In the aforementioned case, the body temperature (15.7 °C) was in substantial balance with that found inside the room where the body laid (15.1 °C). So the estimate of the time of death, based on the thermal decrease, was to be set beyond thirty hours ago. The hypostatic spots, in standard conditions,

generally begin to form after about 30 minutes and become progressively more extended until 10-12 hours after death. Their evolution is characterized by three stages: migratability, relative fixity, and absolute fixity. During the inspection, the corpse had slightly attenuated hypostasis to an energetic long-lasting massage and not modifiable with body displacement, so at an initial absolute fixation stage. The cadaveric stiffness generally begins after about 3-4 hours from death at the level of mimic and masticator muscles. Subsequently, according to Nysten's law, it extends in the skull-caudal direction to all skeletal muscle districts, which will be completely affected after about 7-12 hours. The maximum intensity is reached after about 36-48 hours after death. After that, following the same order of appearance, i.e. in the skull-caudal direction, the stiffness resolution phase begins, which is completed after about 72-80 hours. The cadaveric stiffness in the present case was, at the time of the inspection, in way of resolution. These consecutive thanatological phenomena were associated with the complete absence of transformative phenomena. Therefore, all the thanatological elements available to us, found during the inspection, supported a death time of about 48-72 hours before the discovery of the corpse. The estimate of the post-mortem interval was confirmed by the nomogram of Henssge^{1,3}. This was in strong contrast to the results of the Judicial Police investigations, which placed the criminal event occurrence the week before. The explanation of this phenomenon or of such anomalous tendency in the thanatological phenomena suggests that the microclimatic conditions created in the environment where the corpse was located, significantly slowed down the evolution of post-mortal processes. In this sense, it should be emphasized that the chronology of the hypostatic spots is subject to great variability, especially in relation to the period of fixity initiation, which according to some authors^{4,5} can also occur hundred or more hours after death. Even cadaveric stiffness is influenced by environmental factors, and in particular by the outside temperature. In a study of corpses kept at a constant temperature of 4°C, the persistence of cadaveric rigidity was observed far beyond the classical limits reported in the literature as it was observed a shift from generalized to partial rigidity between the eleventh and the seventeenth day post mortem⁶. A further study on rigor mortis intensity variations at various environmental temperatures (6, 24

and 37 ° C) on rats showed that, at low temperatures, there is a gradual and substantial increase in muscle rigidity given by the sum of classic rigor mortis and the so-called “cold rigidity”⁷. The action of environmental factors can influence post-mortal transformative processes by favoring an abnormal evolution of the thanatological phenomena.⁸

Under standard conditions, the chromatic phase, the first stage of putrefaction, begins with the appearance of green stain after about 12-18 hours in the summer period and after 1-2 days in winter. This phase, caused by the enzymatic activity of the intestinal tract commensal bacteria, is strongly influenced by the temperature outside of the corpse. In fact, if the ideal temperature for putrefaction is between 21 °C and 38 °C, because it increases bacterial autolysis, temperatures below 10 °C block the putrefactory processes^{9,10}.

CONCLUSIONS

The presented case is worthy of reporting because it shows the difficulties encountered in the medico-legal practice in determining of the death time. The examined case emphasizes the influence of environmental factors on the thanatological processes and the importance of studying the climatic and microclimate conditions of the environment where the corpse is found. Nevertheless, it should be noted that environmental surveys are not always feasible and microclimatic conditions are often unmanageable and unverifiable. In the case we report, the thanatological phenomena found during the survey, placed the death time 48-72 hours before the corpse was discovered, but the investigations of the Judicial Police showed how the murder was committed a week before. The explanation of the anomalous development of the thanatological phenomena suggests that in the environment where the corpse was located, microclimatic conditions that significantly slowed down the evolution of post-mortal processes were present, bringing the time of death to a time antecedent to that established. It can therefore be asserted that, in general terms, the earlier the thanatological data are collected in relation to the time of death, the greater is the likelihood of the death time estimate to be correct, as the influence of the environmental factors that can change their evolution is reduced.

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