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An autopsy case of a stowaway who was found dead in the hatchway of the landing gear of Moroccan plane: Case report and assessment of previous literature

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Abstract
The patient was unknown man in his twenties who was found lifeless in plane's landing gear compartment of Moroccan Royal airline operating flight from Conakry to Casablanca. The autopsy was performed 24 hours after the body was found. External examination of the body revealed traumatic skin abrasions and scrapes more pronounced on the chest, abdomen and limbs. The body was very frozen and Rigor mortis had already set in. Internal examination revealed brain congestion with pinkish color of the white matter, moderate hemothorax in right pulmonary cavity with fracture of 6th right rib and moderate contusion of lower lobe of the right lung. No other remarkable abnormalities were noted of other organs.
Therefore, the cause of death was judged to occur as a result of the combined effect of hypothermia and thoracic trauma, based on the circumstances of the case and climatic conditions where the deceased was in, and the autopsy findings.

Keywords: stowaway, landing gear compartment, hypothermia, chest trauma, autopsy

Introduction
Stowaways or persons looking to make their way across international borders often hide in the wheel well (landing gear) of aircrafts. They have to contend with hypoxia and hypothermia, which are two life-threatening conditions [1].
Basically, after takeoff, the landing gear retracts into the wheel wells, potentially crushing the stowaway [1]. During flight at altitudes above approximately 2,500 m (8,000 ft), hypothermia becomes a risk and reduced atmospheric pressure and partial pressure of oxygen may impair physiological processes [2]. At all cruising altitudes of jet aircraft, the partial pressure of oxygen in a wheel well is below that required to support brain consciousness [2]. At altitudes above 6,000 m (20,000 ft), stowaways may also develop decompression sickness and nitrogen gas embolism [2]. Temperatures also decrease with altitude, and may drop as low as −63 °C (−81 °F) [5]. As the plane descends to lower altitudes, a gradual rewarming and reoxygenation occur [2]; however, if the stowaway does not regain consciousness and mobility by the time the landing gear is lowered during final approach, or has already died, the body may fall from the aircraft [3].
We autopsied unknown young male stowaway who was found dead in the hatchway of Moroccan plane's landing gear to identify the cause of death.

Case Report
1- Case history
In September, 30th 2019, a stowaway hidden in the hatchway of Moroccan plane's landing gear was found dead upon arrival in Casablanca city.
According to the police's report and Moroccan Airline Company's statement, a stowaway who clung to a flight from Conakry, capital city of Guinea, to Casablanca, Morocco's economic hub, was found dead at Casablanca Mohammed V airport. His body was found in the hatchway of the landing gear of a plane of Moroccan national airline, the body was dangling from the jetliner when it landed in Morocco.
The stowaway, who snuck into the plane's "wheel-well" where landing gear and wheels are stored between take-off and landing, was suspected to be frozen to death in mid-air because

of the temperatures which could fail to minus 60 degrees Celsius.
A medicolegal autopsy was requested by the prosecutor to establish the cause of death.

2. Autopsy findings

External examination of the body found traumatic skin abrasions and scrapes more pronounced on the chest, abdomen and limbs. The body was very frozen and Rigor mortis had already set in.
The autopsy was performed using Rokitansky's technique after straight I shaped incision from the chin to pubic symphysis avoiding umbilicus in its way and evisceration. The most important findings were brain congestion with pinkish color of the white matter, moderate hemothorax in right pulmonary cavity with fracture of 6th right rib and contusion of lower lobe of the right lung. No other remarkable abnormalities were noted of other organs.
Given the circumstances of the case and climatic conditions where the deceased was in, in addition of the autopsy findings, the cause of death was judged to occur as a result of the combined effect of hypothermia and thoracic trauma.

Discussion

Accidents involving stowaways hiding in plane's landing gear compartment have been reported on the internet to have occurred in many countries. Several stowaways, notably adolescents from Africa, have been found frozen to death or crushed in the undercarriage of Western-bound planes [3].
In some internet reports of similar accidents, deaths have been attributed to factors, such as hypoxia, caused by oxygen deficiency, or hypothermia due to the climatic conditions during the flight, or polytrauma due to fall from high distance [3]. However, due to the lack of autopsy cases reported in international medical journals, the mechanisms of deaths resulting in such accidents have not been adequately investigated.
In our case, we autopsied a stowaway who was found dead in the hatchway of plane's landing gear, and through this case report, we noted that except for chest trauma that we found; our autopsy findings were mostly nonspecific. We, therefore, concluded that the cause of death was occurred as a result of the combined effect of hypothermia and thoracic trauma. This conclusion was established based on probabilities rather than unambiguous proof, given the circumstances of the case as well as climatic conditions where the deceased was in and the autopsy findings.
In forensic medicine and pathology, cases of hypothermia were considered as a special challenge to forensic experts due to their complex nature, and the lack of autopsy findings [4]. Postmortem examination in hypothermic deaths might reveal little or no diagnostic findings, making the diagnosis extremely difficult to establish based on morphology alone [5]. Many findings related to the diagnosis of hypothermia have been indicated as nonspecific findings in the literature, such as frost erythema, Wischnewski spots, hemorrhages into the synovial membrane, bloody discoloration of synovial fluid of the knee, and basal vacuolization of the renal tubular epithelial cells [6]. Nevertheless, their absence does not allow the diagnosis of hypothermia to be ruled out [7].
Moreover, biochemical investigations of some parameters such as blood ketones, cortisol, and free fatty acids as well as urine catecholamine and cortisol, are useful in detecting metabolic changes occurring after exposure to cold. Even so, abnormalities in biochemical results must be interpreted carefully, as they do not allow the diagnosis to be either categorically excluded or formally confirmed [8].
The diagnosis of hypothermia as the cause of death in such incidents which involves stowaways has to be made after careful consideration of the history, the circumstances at the scene and a thorough postmortem examination to rule out other causes of death such as preexisting diseases, or trauma or both, which can potentially be responsible for loss of consciousness, coma, and death on their own [9]. Furthermore, the question whether hypothermia is the main or only a contributing cause of death must be legitimately raised, and it must sometimes be established based on probabilities [10], like in our case report.
A multidisciplinary approach based on postmortem investigations should be promoted among forensic pathologists to establish the cause of death of stowaways. Besides, some of the hypotheses formulated in (at present) isolated studies by distinct groups of authors might be validated, confirmed, or invalidated, thus contributing to a better understanding of the pathophysiological responses that take place during hypothermia-related deaths of stowaways.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

Conclusion

In conclusion, correct sampling at the scene and postmortem examination, as well as interdisciplinary cooperation of all professionals involved, are essential to further clarify issues. Aside from the human drama, this shows a major failing of security at airport where a stowaway could gain such access. Through this case report, we note the need for an examination of strict measures to prevent future similar human tragedy.

References

1. USA Today, FAA: Most plane stowaways in wheel well die, 21 April 2014. https://www.usatoday.com/story/news/nation-now/2014/04/21/stowaway-planes-hawaii/7957357/.
2. "Wheel-well Stowaways Risk Lethal Levels of Hypoxia and Hypothermia" (PDF). Flight Safety Foundation 1997. Retrieved June 15, 2015.
3. Jason Koebler, Motherboard. The Science of Stowing Away in an Airplane 2015. https://www.vice.com/en_us/article/qkv9pw/the-science-of-stowing-away-in-an-airplane.
4. Lim C, Duflou J. Hypothermia fatalities in a temperate climate: Sydney, Australia. Pathology 2008;40:46-51.
5. Kirsch KA, Gunga HC. Physiological aspects of accidental hypothermia. In: Oehmichen M, editor. Hypothermia. Clinical, pathomorphological and forensic features. Lu ¨beck: Schmidt Ro ¨mhild 2004.
6. Dolinak D, Matshes E, Lew E. Hypothermia. In: Forensic pathology. Principles and practice. Elsevier, Academic, 1st ed. San Diego 2005, 248-249.
7. Madea B, Tsokos M, Preuss J. Death due to hypothermia. Morphological findings, their pathogenesis and diagnostic value. In: Tsokos M (ed.), Forensic pathology reviews 2008;5:3-21.

8. Palmiere C, Mangin P, Postmortem biochemical investigations in hypothermia fatalities. Int J Legal Med 2013;127:267–27.
9. Nixdorf-Miller A, Hunsaker DM, Hunsaker JC III. Hypothermia and hyperthermia medicolegal investigation of morbidity and mortality from exposure to environmental temperature extremes. Arch Pathol Lab Med 2006;130:1297-304.
10. Turk EE, Sperhake JP, Pu ¨schel K, Tsokos M. An approach to the evaluation of fatal hypothermia. Forensic Sci Med Pathol 2005;1:31-5.