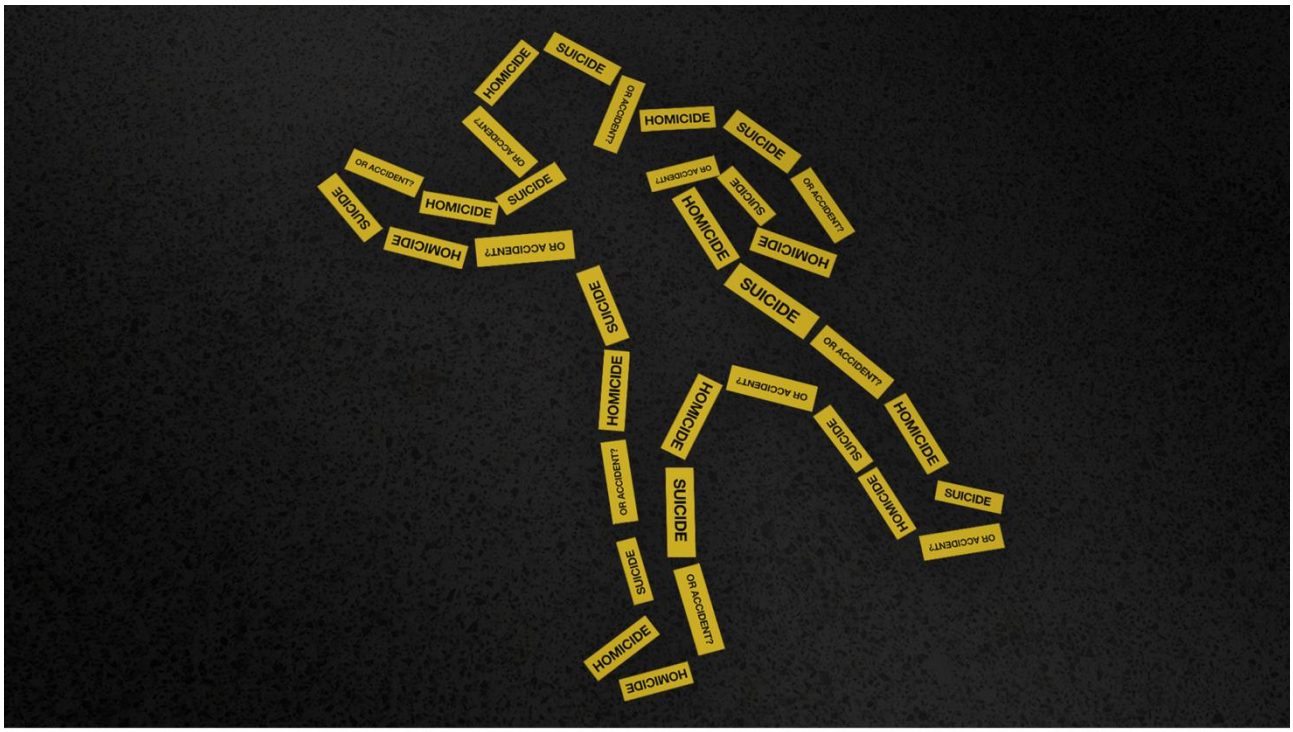


28TH INTERNATIONAL MEETING ON
FORENSIC MEDICINE
ALPE-ADRIA-PANNONIA (AAP)

# Homicide, suicide or accident?

and the associated

# ECLM Educational Meeting Legal and Forensic Medicine: The Future of Undergraduate Medical Teaching in Europe for today's Doctor in Practice

**September Thursday 7th – Saturday 9th, 2023**
**Palazzo Toppo-Wassermann,**
**via Gemona 92, 33100 Udine, Italy**

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# THE ROLE OF THE AUTOPSY IN THE SEARCH FOR DRUG-RELATED DEATHS IN SLOVAKIA

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**Introduction**. Nowadays, the detection of drug-related deaths represents an advanced and essential part of everyday forensic medicine practice. This paper aims to present the concept and results of monitoring drug-related deaths in Slovakia from the autopsy practice point of view.

**Patients and Methods**. An analysis of the development of the autopsy rate was conducted in Slovakia in the period 2005 – 2021. The focus was directed to all those deceased who had died in relation to drug abuse. Obtained data were analysed according to the European Monitoring Centre for Drugs and Drug Addictions methodology.

**Results.** The autopsy rate decreased in the period 2005 – 2021 from 18.1% to 10%. Psychoactive substances in toxicologically significant concentrations were detected in 1,737 cases in total, i. e., in 2% of all autopsied cases. Illicit drugs were involved in 57% of cases. Out of the total number of cases, 74% referred to males. More than 42% of cases were of those aged up to 34 years. Overdose of psychoactive substances caused death in 766 (44%) cases (direct deaths). In the group of indirect deaths, death was most often caused by accident (39%).

**Conclusion.** The number of illegal drug overdoses averaged 23 per year. In the age group 15 – 64 years, the number of direct deaths caused by illicit drugs a year ranged from 4 to 10 (mean 6) per 1,000,000 of population. These facts rank Slovakia among the countries with the lowest illicit drug overdose death rate in Europe.

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- I understand that my abstract will be published, if accepted, as submitted and that no editing to grammar or spelling will be undertaken by the Organizing Committee;

# ORAL COMMUNICATIONS

# A 20-YEAR RETROSPECTIVE ANALYSIS OF CHILD AND ADOLESCENT HOMICIDE IN SOUTHEAST SERBIA

**Aleksandra Antovic**[1*], Goran Ilic[1], Ivan Stojanovic[1], Stevan Todorovic[1], Miroslav Milic[1], Milica Miljkovic[1], Marija Nikolic[1], Bogdan Pinterovic[1]

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**Introduction:** This study investigates the incidence, epidemiological, and forensic characteristics of child and adolescent homicide victims in the southeast region of the Republic of Serbia to shed light on this medico legal, social, and public issue.

**Material and method**: We conducted a retrospective analysis of all autopsies performed at the Institute of Forensic Medicine in Nis (n=14542) between 2003 and 2022, focusing on homicide cases involving victims aged 0 to 18. The number of fatalities, the victim's age and gender, the perpetrator's relationship to the victim, the cause of death, the type of injury, and the injury pattern were analyzed.

**Results:** Children and adolescents were involved in 5.7% (n=26) of all homicides (n=453). The majority of victims were female (65.38%), averaged 7.3 years old, and resided in rural areas (69.2%), while the majority of offenders were male (69.23%). In 46.15% of cases, the perpetrator was a birth parent, most often the mother (30.77%). Physical violence was present in 30.77% of the cases, sexual violence in 3.8%, and poisoning in 3.8%. The most prevalent cause of death was exsanguination, followed by blunt trauma. In 34.61% of cases, excessive force (overkill) was used. Six infants were killed due to multiple homicides, and the seven perpetrators (26.92%) committed suicide.

**Conclusion:** This study's findings emphasize the importance of forensic medicine in identifying cases of child and adolescent homicides and the significance of judicial assistance in solving this extreme form of violence.

Keywords: **forensic, medicine, child, homicide**

# DISTRIBUTION OF VIOLENT DEATH TYPES BEFORE AND DURING THE COVID -19 PANDEMIC IN RIGA DISTRICT IN 2017-2021

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**Introduction:** Following the announcement of the Covid - 19 pandemic on March 11'th 2020 by the World Health Organization, socio-economical, physical and psycho-emotional aspects of life have been affected. The global impact of the Covid - 19 pandemic induced lockdown on the changes in the amount and types of violent death cases has not been studied extensively, however, the results of such study could aid in development of epidemiological safety measures in case of future pandemics, which would save people's lives and help reduce Latvia's socio - economical losses.

**Materials and methods:** Latvia State Ce

ntre for Forensic Medicine archive materials for the time period 2017- 2021 were reviewed and 2701 violent death cases were selected and analyzed.

**Results and Conclusions:** Covid - 19 lockdown in Latvia has not affected the distribution of violent death types in Riga district. The timing, duration and strictness of the lockdown is only one of the factors that can induce quantitative and qualitative changes in mortality rates. Further research is advised to determine other conditions that influence mortality rates during the pandemic and lockdown. Future implementation of lockdown practices of the same or similar severity as in 2021 may not affect the distribution of violent death types.

# ESTIMATING THE POST-MORTEM INTERVAL USING DECOMPOSITION SCORING SYSTEMS. A COMPARATIVE STUDY.

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**Introduction**: Estimating the Post-Mortem Interval (PMI), is a crucial task in every death investigation especially once early post-mortem change cannot be used anymore, and putrefaction process has already taken place. Several quantitative methods of scoring decomposition have been suggested. Among them, two approaches are worth of mentioning: Total Body Score (TBS) and Total Decomposition Score (TDS). In the present study, TBS and TDS have been applied on forensic cases with known PMI and then compared with the accumulated degree-days (ADDs) estimated by using the entomological method for bodies colonized by insects.

**Materials and Method**: the sample study was represented by 15 bodies (6 females and 9 males) with an age range from 29 to 86 years, mostly discovered indoor (8 out of 15 cases). The range of presumptive PMI was from a minimum of 10 days up to rather two years. The series of cases was divided in three groups according to the PMI: shorter than 50 days (7 cases), in between 50 and 100 days (5 cases), longer than 100 days (3 cases).

**Results:** for PMI lower than 50 days entomological method provided a fairly accurate estimate, while for PMI between 50- and 100-days TDS resulted to be more reliable than TBS and the predictive accuracy in the PMI estimates was increased by entomology For PMI > 100 days none of the methods was reliable

**Conclusions**: the entomological method can improve the predictive accuracy of TDS in the PMI estimation, especially for bodies with PMI<100 days.

# MEDICOLEGAL IMPLICATIONS OF DEATHS DUE TO AGRICULTURAL ACCIDENTS

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**Introduction:** Accidents in agricultural contexts often result in death, serious injury or disability, and are more common than in other working environments.

**Methods:** A literature review was planned in order to evaluate the most frequent dynamics and causes of death due to agricultural accidents.

**Results:** The most frequent causes of farming deaths are:

- Lack of technical experience and training in the operation/handling of machinery and equipment.
- Underestimating technical and environmental risks.
- Lack of or inadequate safety equipment and/or PPE.
- Outdated and/or poorly maintained machinery/tools.
- Long working hours, sometimes at night, causing fatigue and a lack of care and attention
- Working in a challenging working environment, in adverse weather conditions, sometimes under the influence of alcohol or drugs.

Typical agricultural accidents are due to:
- Loss of control of wheeled or tracked vehicles, generally due to careless driving.
- Loss of control of self-propelled or towed machinery or entanglement in their gears.
- Falls from height.
- Fatalities related to attacks by large domestic animals or small insects such as honey bees.
- Exposure to chemical or polluting substances or biological agents, being crushed while felling trees, electrocution by electric cables or during lightning strikes, and drowning in waterways, vats or tanks.

**Conclusions**:Forensic pathologists may be required by the Courts to determine cause of death and confirm that the fatality was accidental rather than the result of homicide or suicide. This is achieved by understanding the circumstances surrounding the event and the traumatic lesions inflicted, by autopsy and toxicological investigations.

## MULTIPLE SHOTS OF DIFFERENT FIREARMS IN A CHARRED CORPSE

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**Introduction:** in this case report we describe the steps to identify a charred body found in a completely burned car and to define its cause of death.

**Materials and methods:** first forensic examination after the transport of the vehicle, found in an isolated country area, to a sheltered place due to the extreme fragility of the burnt skeleton with loss of bone fragments, including the cranial ones; as following steps: cadaveric section, total body CT scan, histological, toxicological and genetic investigations.

**Results:** the forensic pathologist detected a deeply charred corpse, lying prone in the trunk of the car. After cuts of car parts, the skeleton underwent a total body CT scan, that showed several foreign bodies compatible with firearm bullets at the base of the skull and in the torax-abdomen. At the cadaveric section we found a gun bullet in the thorax wall, multiple metal pellets and a retained wad in the right lung, three wads and numerous metal pellets in the abdomen; in addiction, the stomach, the left kidney and the aorta were injured by firearm. Histologically there were no carbonaceous residues in the airways and the carboxyhaemoglobin level resulted very low (3.6%). No exogenous substances were found at toxicological exams. The cause of death was identified in a hemorrhagic shock. The genetic investigations, integrating the circumstantial data, allowed the identification in a missing man.

**Conclusion:** despite the intense carbonization of the corpse, a forensic pathology investigation with multidisciplinary approach contributed significantly to the solution of a murder case.

# PROBLEMS AND PECULIARITIES OF CORPSE EXAMINATION AT THE SCENE OF THE INCIDENT IN UKRAINE

Valery Gunas*

National Pirogov Memorial Medical University, Vinnytsya

**Introduction**. Examination of the corpse at the place of its discovery is a key procedural action, which not only starts the forensic examination, but also provides a significant amount of material evidence, which then allows the police to solve the issue. However, the obsolescence of regulatory documentation and inconsistency with the current legislation creates problems in the qualitative implementation of this procedure.

**Materials and methods**: a review of the legal documentation regulating the examination of the corpse at the place of its discovery was carried out; the archive of the Vinnytsia Bureau of Forensic Medical Examination was studied.

**Results**. The lack of any regulation of the behavior of the forensic medical expert at the scene of the incident is a key problem that causes not only a decrease in the quality of the expert's work, but also significant differences in the process of examining the scene of the incident in different regions of the country. The lack of clear terms in the legislative framework causes different interpretations by doctors, police and forensic experts and as a result leads to conflict situations.

**Conclusions.** Taking into account the obtained results, there is an urgent need to create a normative document that would regulate the examination of the corpse at the place of discovery and would be valid throughout the country and aligned with European (world) practice.

## ACUTE STRESS INDUCED MYOCARDIAL CHANGES

## IS IT POSSIBLE TO PROVE THE LEGAL TERM OF 'SPECIAL CRUELTY' BY HISTOLOGICAL EXAMINATION?

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**Introduction**: In the Hungarian criminal law the term of 'special cruelty' is an aggravating circumstance when penalizing for murder or fatal bodily harm. In judicial practice special cruelty is based on the number, severity and nature of the injuries inflicted on the victim, however, circumstances causing great psychological suffering can also exhaust the concept of cruelty. Histological examination of stress-related myocardial changes may provide an opportunity to prove the stress. In our present study, we investigated the possible effect of intense acute stress on heart muscle - as a possible analogue of Takotsubo syndrome, where structural damage of cardiomyocytes and infiltration of inflammatory cells are considered indicative.

**Materials and methods**: There were 9 cases selected from the autopsies material of our Department proceeded between 2012-2022 years. Prolonged physical abuse and/or psychological stress inflicted on the victim prior to death were the main inclusion criteria.

Myocardium specimens were investigated by immunostaining (desmin, CD45 and CD68) beside routine haematoxylin and esosin staining.

**Results**: The observed strain-signs, interstitial edema and intra- and/or extravascular infiltration of leucocytes, desmin depletion, presence of LCA-positive leucocytes and CD68-positive macrophages were seen in some cases.

**Conclusion**: Based on our study, it emerged only in one case that acute stress could had been the background etiology of the histological changes seen in the myocardium.

# AORTA INJURIES IN ROAD TRAFFIC ACCIDENTS

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Institute of Forensic Medicine, Medical Faculty, University of Niš, Dr Zoran Djindjić blv. 81

**Introduction:** Rupture of the aorta were incredibly common approximately 50 years ago, and in the case of road traffic accidents accounted for 10-15% of related fatalities. Any violent injury caused by a road traffic accident will always be a very complex problem, the injuries are never seen alone, there will always be multiple injuries internally and externally. This produces incredible difficulty when trying to determine the cause of injury and the cause of death.

**Materials and methods:** Within thoracic injuries one of the leading causes of death are fatal injuries to the aorta ranging from intimal damage to complete transection. Approximately 40 years ago as much as 10-15% of all deaths from road traffic accidents were attributed to rupture of the aorta. This percentage has of course been reduced since the use of seatbelts and airbags but these safety measures themselves can inflict injury to the head and thorax.

**Results and conclusions:** Three main mechanisms of aortic injury have been described and it is thought that it is a combination of all three mechanisms that leads to the rupture or injury of the aorta in traumatic traffic accidents. The osseous pinch theory refers to the aorta being trapped and torn bony structures. The Water-Hammer theory describe a pressure wave caused by occlusion travelling retrograde up the aorta and cause the aorta to burst from the inside. The hyper-flexion and hyper-extension mechanism is the most common and is commonly known as a ‘whiplash’ injury.

# HOMICIDE OR SUICIDE? A PROBABILISTIC APPROACH FOR THE EVALUATION OF THE MANNER OF DEATH IN A SERIES OF SHARP FORCE FATALITIES

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**Introduction.** The forensic pathologist is frequently asked to define if a sharp force fatality is the consequence of a suicide or of a homicide. The Likelihood Ratio (LR) offers a quantitative approach to conveying the strength of expert evidence. This paper utilizes data from a systematic review to obtain extensive datasets, demonstrating how the LR can be applied to assess the manner of death in sharp force fatalities.

**Materials and methods.** A database of 173 suicides and 354 homicides was obtained from four retrospective studies. Recurrent forensic characteristics were extracted, and LR values were calculated only for characteristics that significantly differed between homicides and suicides.

**Results**. Anatomical wound distribution, blood alcohol detection, history of psychiatric illness of the victim, clothing damages, place where the body was found, and type/location of the sharp object were used for the LR calculation. LR values were calculated for a casework of 6 sharp force fatalities and ranged from 603 to 123.568 in suicides (n=3), and between 8 and 15.674 in homicides (n=3).

**Conclusion**. Compared to other fields of forensic sciences where the LR is extensively applied, in some cases, the obtained LR is relatively low. However, in forensic pathology, there is evidence that falls outside the expert's purview, requiring the trier-of-fact to make conclusions on the matter. To comprehensively apply the LR in the field of sharp force fatalities, it is necessary to standardize investigative methodologies and data collection in descriptive studies and validate this approach on a larger scale of casework.

## IMPALED ON A FENCE: HOMICIDE, SUICIDE OR ACCIDENT (case report)

Peter Kadiš, Tina Čakš Golec, Živa Žerjav*

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**Introduction**: A 64-year-old woman was found dead in front of her residence, impaled on a metal fence through her breasts.

**Materials and methods:** A police investigation was conducted, including investigation of the crime scene and several interviews. The body was inspected by the local coroner on the spot and an autopsy with external examination and toxicology report was performed by a forensic pathologist.

**Results and conclusions:** At first a crime of sexual nature was suspected due to positioning of the body. However, the front door of the house was locked and an open roof window and skid marks on the roof beneath it were found, the back side and the knee area of the deceased were dirty. Through several interviews it was determined that the deceased was depressed and treated with antidepressants, and was said to consume larger amounts of alcohol and used that particular window to smoke. The autopsy showed two superficial and one deep puncture wound of the breasts, several broken ribs with torn intercostal muscles bilaterally, minimal bilateral haematothorax, lacerations of the lungs, a puncture wound of the pericardium and the right atrium of the heart with tamponade, suffusions on both knees and excoriations and suffusions on dorsum of both feet. The injuries are consistent with a fall from height onto a metal fence. The toxicology report was positive for tramadol, zolpidem and clomethiazole and negative for alcohol. Due to lack of additional and firmer evidence it was not determined whether the death occurred as result of an accident or suicide.

# FORENSIC MEDICAL ISSUES WHICH COVER A SEVERE BACKGROUND CRIMINAL CASE.

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**Introduction**: During the daily forensic practice either in the autopsy room or in clinical forensic cases we meet those cases which look to be rather simple for the first sight, suicide, not too severe crimes, but when going into the depth we find an unforeseen, more severe criminal case. In this cases the police have been alarmed by the medical expert.

**Material and method**: We collected some recent eight cases from the archives of the Department of Forensic Medicine, University of Szeged, Hungary as a case series to demonstrate the issue and present the typical 'background' problems. We show a case when among the anonym data of a research we discovered a crime, a case when a drunken child's story covered an illegal drug dealing, and some others.

**Results and conclusion**: Missing these cases could have been 'forensic medical expert's malpractice' or forensic diagnostic mistake. The overview of the cases let us conclude that there are no 'simple cases'; that the forensic expert must be autonomous in his thinking, when re-evaluate and correct the data and the police-opinion of a case. The expert must know all the circumstances and also the legal environment of the analyzed case. The most important conclusion is that the forensic medical expert must follow a complex protocol for clarifying the cases, there is no way to make compromise neither when the time strain nor when the case history makes a first impression of a simple case.

# THE APPLICATION OF APPLE LIDAR MOBILE 3D SURFACE SCANNING OF CRIMESCENES AND OBJECTS

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**Introduction**: The visual 3D documentation of the crime scene, corpses and individual objects (fragments, weapons, motor vehicles, etc.) provides several additional opportunities for the forensic medical examination and the investigation: more detailed and understandable documentation of the facts and their spatial orientation; better measurement of objects and distances between them at a later stage; ability to compare marks with the object that left them (for example, a gunshot wound, or a vehicle trace on body). A significant advantage is also the presentation of the results in court in a much more understandable and clear form than through words, photos and diagrams.

**Methods**: Through mobile hybrid scanning technology (LiDAR plus photogrammetry) built into and supported in software by iPhone Pro and iPad Pro, forensic 3D scanning capabilities are greatly enhanced and more accessible. It is much easier technically and shorter in time to use the specialized applications for these devices. Some of the apps are tested in forensic environment.

**Results**: Different applications have their advantages and disadvantages. The technology itself has pros and cons - good for details or better for measuring and comparing larger objects - depending on the methodologies and graphic file formats used. Great results are obtained from the combination of crime scene objects surface scanning and medical computed tomography scanning of bodies and injuries, which gives an advantage in comparative study of these objects.

**Conclusion**: In our presentation, we try to briefly show and describe these qualities and their utility in a real-world investigative and medicolegal setting.

Key words: LiDAR, 3D surface scanning, crime scene investigation, forensic medicine

# COCAINE-RELATED DEATHS:

# FORENSIC CHARACTERISTICS AND POSTMORTEM TOXICOLOGY ANALYSIS

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**Introduction:** Cocaine-related deaths are caused by poisoning per se but may also occur due to acute behavioral alterations and consequent injury. Interpretation of postmortem toxicology analysis can be challenging because of the concomitant use of other illicit substances, psychotropic drugs, and ethanol or non-lethal drug levels.

**Aim:** To determine the frequency and forensic characteristics of autopsy cases with cocaine intoxication.

**Material and methods:** The study included subjects autopsied at our institution over four years (2019-2022), whose body fluids contained cocaine. The blood, vitreous humor, and urine cocaine concentrations, co-intoxication with other psychoactive substances, and the cause and manner of death were analyzed.

**Results:** In the observed period, 3682 forensic autopsies were performed, and in 1378 (37.4%), toxicology analysis was performed. In 23 cases (1.7%), cocaine (20 men, 3 women) was identified, of whom 14 (61%) occurred in the year 2022. The median age was 36.9 years (range 24–51). Median cocaine concentrations were 0,17 mg/L, 0,1 mg/L, and 0,1 mg/L for blood, vitreous humor, and urine, respectively). In 6 cases, only cocaine metabolites were detected in the blood. No other illicit substances were detected. In 7 subjects, psychotropic drugs and in 6 ethanol were detected (median 0.81 g/L). In 10 cases, death was directly due to cocaine intoxication, and 3 more due to other drugs. There were 7 suicides (1 drug overdose), 3 homicides, and 13 accidents.

**Conclusion:** Cocaine-related deaths comprise a heterogenous group of violent deaths, mainly caused by accidental and suicidal injuries, but fatal poisoning is not infrequent.

**Keywords:** ***cocaine, forensic toxicology, postmortem diagnostics, poisoning***

# CHARACTERISTICS OF HOMICIDAL AND SUICIDAL SHARP FORCE FATALITIES AT INSTITUTE OF FORENSIC MEDICINE IN LJUBLJANA – APPLICATION OF GATHERED KNOWLEDGE IN A COMPLEX CASE

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## Introduction

In cases of investigation of sharp force fatalities it is necessary to differentiate victims of homicide from suicide victims or even accidental deaths. A combination of all available information from potential crime scene, deceased's medical records, autopsy findings and results of toxicological analysis is required to correctly determine cause and manner of death.

## Materials and Methods

Case documentation of victims of all homicidal and suicidal sharp force fatalities autopsied at the Institute of Forensic Medicine in Ljubljana between years 2008 and 2018 was reviewed in order to extract information regarding victims sex and age, place of death, weapon or tool used to cause injuries, anatomical regions injured, number and type of injuries, results of toxicological and alcoholometric analysis, history of illicit drug or alcohol abuse and history of mental illness or psychiatric treatment.

## Results

Study results were compared to previous published studies and accepted criteria used to distinguish homicidal from suicidal sharp force injuries confirming general consistency with established knowledge.

## Conclusion

Practical application of gathered information is shown in a presentation of a complex case of a domestic murder-suicide with several sharp force injuries present both on female and male partner where only complete integration of all investigations allowed for determination of perpetrator and victim and cause of death.

# DIFFERENTIAL DIAGNOSIS BETWEEN SUICIDE AND HOMICIDE IN COMPLEX CASES: THE IMPORTANCE OF ON-SITE INVESTIGATION. A CASE REPORT ON A DEATH BY THROAT-CUTTING AND HANGING.

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Complex cases involving multiple injuries of different etiologies represent a challenge for forensic pathologists. An effective analysis targeted to rebuild the dynamics of the fatal event should always include on-site investigation, autopsy, histological analysis, and toxicology.

We describe the case of a 75-year-old man found dead at home, suspended by bed sheets in a typical and incomplete hanging. The on-site investigation revealed bloodstains spread across multiple rooms, particularly abounding on his bed mattress. Between the sheets, a single-edged switchblade knife was discovered. In the same room of the crime scene intact boxes of psychotropic drugs were found. Autopsy findings revealed a perpendicular cut injury to the neck, involving the right jugular but not the upper respiratory system. Additionally, a stab injury on the abdomen and bruises on the hands and abdomen were observed. A groove was detected, faint over the posterior aspect of the neck, supported by the matching histological evidence. Toxicology tests yielded negative results for psychoactive substances.

Death by slashing is typically related to homicide, although few cases in the literature describe a suicidal dynamic. In this case, the scene analysis dried bloodstains and fingerprints within their context belonging solely to the victim. The hanging injuries were vital, and the bruises on the hands were consistent with suspension.

This study emphasizes the significance of on-site investigation in the differential diagnosis between homicide and suicide, especially in complex cases where an examination of the body alone cannot provide definitive certainty regarding the nature of the death, whether suicidal or homicidal.

# "ONE RING TO FIND THEM ALL": THE POTENTIAL OF SEM/SCANNING ELECTRON MICROSCOPY WITH MICROANALYSIS/EDS IN A MURDER SUSPECT CASE.

**Luigi Papi[(1)], David Forni[(1)], Julia Lazzari[(1)], Ilaria Marcacci[(1)], Naomi Iacoponi[(1)], Andrea Costantino[(1)], Claudia Giaconi[(2)], Ilaria Carboni[(3)], Randa Ishak[(4)], Renzo Valentini[(4),] Silvio Chericoni[(5)].**

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(5) Laboratory of Forensic Toxicology, University of Pisa.

**Introduction**: a 32-year-old man fell out a window on the fourth floor of a building and died few hours later in Emergency Department. The apartment was used for drug dealing. Those present reported that the victim was agitated because he has taken drugs and he jumped while they were in another room.

**Material and methods**: prior to the autopsy, a CT scan of the body revealed multiple fractures. The autopsy confirmed extensive polytrauma. In particular, on the face, in addition to many blunt injuries, there was a sharp injury under the lower lip, which could not be attributed to the fall. That lesion was removed (skin patch) and analysed with different devices and analysis. Toxicological analysis was positive for cocaine and morphine, but the blood concentration was not fatal. The cause of death was determined to be contusive polytrauma after precipitation.

Stereomicroscope and digital microscope observation confirmed the clear edges of the injury. Tomographic analysis and SEM/scanning electron microscopy with microanalysis/EDS identified 1291 particles of inorganic material; among these, in addition to substances considered ubiquitous, particles of platinum and silver were found, that were also found on some rings belonging to the subjects who were present in the apartment. Besides, genetical investigations showed the presence of DNA from two of the suspected on a subungual sampling and on the clothes of the victim.

**Results**: technical investigations led to doubts on the accidental/suicidal/homicidal nature of the fall and to further investigation about the case.

**Conclusions:** these findings, obtained by multidisciplinary supports, showed that the victim was probably injured before the fall.

# MULTIPLE STAB WOUNDS DEATHS: WHAT TIPS THE SCALES TOWARDS SUICIDE?

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2. Modena Local Health Unit, Department of Legal Medicine and Risk Management, Modena, Italy.
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**Introduction:** Death by self-inflicted multiple stab wounds is an uncommon method of committing suicide, accounting for approximately 2% of all cases. The presence of numerous stab wounds typically raises suspicions of homicide. However, a detailed analysis of the injuries and circumstantial elements can assist in determining the manner of death. The authors present a case of death by hemothorax in an individual found with multiple thoraco-abdominal stab wounds.

**Materials and methods:** A 39-year-old man was found dead in his apartment. There were no signs of forced entry. He was wearing a t-shirt with three tissue discontinuations corresponding to the wounds on his chest and hypochondrium. A kitchen knife, fully compatible with the wounds, was found close to the body at the scene.

**Results and conclusions:** Distinguishing between an unusual suicide and homicide in these cases requires comprehensive information from both the autopsy and the crime scene. Often, the self-stabber lifts their clothes to expose the body site to be attacked. In the present case, the clothing showed three incisions that matched those on the skin. Moreover, the crime scene was almost completely bloodless, contrary to what is typically described in such types of deaths. The set of these elements, the attackability of the wound site by the victim and the lack of signs of fighting supported suicidal hypothesis.

## SEMEN DETECTION IN VAGINA SMEARS

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**Introduction**: According to the statistics, there were 1465 sexual assault cases in Hungary, in 2018, constituting a significant public health problem. However, in most cases it is very difficult to prove the occurrence of sexual contact even for the forensic pathologist. In Hajdú-Bihar County, if sexual assault is suspected, the victim is guided to the Department of Obstetrics and Gynecology by the police officer for collection of biological evidence. The samples – being usually vagina and rectal smears – are transported to our department (University of Debrecen, Clinical Center, Institute of Forensic Medicine) for further examinations. Our duty is to find sperm cells or sperm fragments in them. Traditionally, Giemsa staining is applied to differentiate planocellular and sperm cells under light microscope, which is an extremely time-consuming process. Our aim was to find an analytical method, that makes the investigation procedure easier and faster.

**Materials and methods:** We compared the Giemsa staining with Papanicolau, Feulgen and Nigrosin techniques, as well as with anti-ADAM2 antibody immunohistochemistry.

**Results:** Feulgen reaction seemed to be the best method for the demonstration of sperm cells in the biological evidences.

**Conclusion:** The only disadvantage of this test is the necessity of DNA, i.e. it cannot identify sperm cell fragments, if nuclei are not present in the sample. Therefore, our further aim is to find other methods, mainly immunostaining techniques, that are suitable for precise and prompt recognition of complete sperm cells as well as fragments.

# HOMICIDE BY GUNSHOT WOUNDS TO THE HEAD AND NECK – AN UNUSUAL MECHANISM OF DEATH

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**Introduction**: Gunshot wounds to the head and neck often damage vital anatomical structures that are tightly localized in the head/neck region and cause severe bleeding, airway compromise, and nervous system injury.

**Case description**: We present a case of somewhat unusual mechanism of death due to gunshot wounds to the head and neck. In this case, a man was shot to the head and neck from behind with a small caliber weapon and was found dead at the scene. The crime scene suggested prolonged survival period and delayed incapacitation as there were evidence of victims' movement and actions (even sending an SMS about shooting) after being wounded for an, undetermined, but prolonged period. External examination showed well-established livores mortis while internal examination showed impressively voluminous soft tissues of the mouth, pharynx, and larynx with no defects of neck neurovascular structures and no signs of blood aspiration.

**Conclusions**: Taking all into account, we believe that the mechanism of death in this case of gunshot injuries to the head and neck was asphyxia due to massive hemorrhage in soft tissues of the mouth, larynx and pharynx. We find this to be an interesting case showing us the importance of keeping an open mind in establishing the mechanism of death in somewhat obvious circumstances of gunshot injuries, as well as the importance of scene findings in understanding sequelae of death.

## CO RELATED DEATHS: A VERONA CASE SERIES. WHEN COOPERATION BECOMES COMPULSORY

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**Introduction**. Carbon monoxide (CO) poisoning is a significant concern in forensic medicine, as it often presents unique challenges in terms of diagnosis, investigation, and determination of the cause of death. CO is a colourless, odourless, and tasteless gas that can be lethal when inhaled in high concentrations. It binds strongly to haemoglobin, forming carboxyhaemoglobin (COHb), which reduces the oxygen-carrying capacity of the blood, leading to tissue hypoxia and ultimately death.

**Materials and methods**. Circumstantial data, medical history information, autopsy findings, and toxicological analysis results related to 24 CO poisoning cases at the Institute of Legal Medicine in Verona were collected and analysed. The data were examined in an integrated manner to identify correlations and common patterns. A comparison was also made with the data available in the literature.

**Results**. The male gender was confirmed to be the most frequently involved. COHb levels were found to be less than 50% in 6 cases. Three individuals had concurrent cardiovascular pathologies, while 11 subjects tested positive for various substances, including alcohol, benzodiazepines, and morphine. In most cases, the manner of fatal intoxication was accidental, although 6 suicides and 1 homicide were reported.

**Conclusions**. The Verona case series demonstrates that deaths due to CO poisoning require a multidisciplinary approach. The integration of diverse expertise is essential for assessing the manner of death. This approach enables a comprehensive evaluation of the available data, aids in distinguishing between accidental, suicidal, and homicidal deaths, and ensures accurate and reliable forensic conclusions.

# MICRO-CT ANALYSIS OF MORPHOLOGICAL DEGENERATIVE FEATURES OF STERNO-CLAVICULAR JOINT FOR FORENSIC PURPOSES

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**Introduction.** The sterno-clavicular joint's analysis plays an important role for age estimation in forensic anthropology, especially through the medial clavicular ossification stage evaluation, which, however, can only be applied in young individuals under the age of 30 years.

The aim of the present study is to examine, through micro-CT, the external surface of sternoclavicular joints of individuals deceased at different ages to identify age-related morphological degenerative changes that could be useful for the purpose of age estimation in adults.

**Materials and methods.** The sterno-clavicular joints of one side of 41 dead subjects, divided into three age-at-death ranges (18-40 years; 41-60 years; >60 years), were examined. Degenerative morphological features of both clavicular and sternal articular surfaces, including surface topography, porosity and presence of osteophytes, were evaluated according to a composite scoring system based on a modified "Falys-Prangle method", which assigns to each parameter the following score ranges: 1-3 for surface topography (smooth, slightly irregular, markedly irregular), 1-6 for porosity (absent, micro- and macroporosity for <50% or >50% of surface, surface breakdown), 1-3 for osteophytes (absent, present, not evaluable).

**Results.** The degenerative morphological features of both clavicular and sternal articular surfaces showed a significant correlation with age. Furthermore, the combination of scores for clavicula and sternum revealed an even stronger correlation with age (average score obtained for each age range: 18-40 years=8,89; 41-60 years=12,69; >60 years=16,5).

**Conclusions.** Micro-CT evaluation of degenerative morphological features of sterno-clavicular joint is a reliable and efficient method for age estimation in adult individuals.

# THE ROLE OF THE FORENSIC PATHOLOGIST IN ASSESSING CRUELTY AS AGGRAVATING FACTOR OF HOMICIDE

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**Introduction:** In cases of homicide, cruelty often is a difficult-to-prove aggravating factor that lends itself to discussion and fierce opposition during the trial. Here we present a case where the contribution of the forensic pathologist was crucial in addressing this matter. The body of a 33-year-old man was found in his apartment after a violent fight, with multiple traumatic injuries. Subsequent investigations identified six individuals potentially involved in the crime.

**Materials and methods:** Forensic investigations were conducted, including imaging, autopsy, histological and immunohistochemical examinations and toxicological analysis.

**Results:**The CT scan of the body identified multiple fractures of the ribs, face, fingers and spine; the autopsy identified numerous injuries, including multiple abrasions, bruises, and lacerations on the face, trunk and limbs, two amputated fingers, two missing teeth, laceration of the spleen and the presence of digested food in the airways. Toxicology revealed THC positivity. Immunohistochemical analysis were used to date the various lesions through searching for CD15, CD45, LCA, P-selectin and E-selectin, demonstrating a timing ranging from one hour before death to injuries inflicted in liminae vitae.

**Conclusions:** The cause of death was determined to be a synergism between hypovolemic shock and asphyxia due to inhalation of regurgitated food. The type of injuries observed (amputation, full thickness lacerations), none fatal, along with the immunohistochemical demonstration of a long lasting aggression, allowed the aggravating factor of cruelty to be proven during the criminal proceedings. At all levels of judgement, the judges upheld the view expressed by the forensic pathologists.

# STABBING WITH HOUSEHOLD WEAPONS.

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**Introduction:** There is only limited experimental data available on the penetration capabilities of various household tools during stabbing. Stabbing tests of twelve different household weapons were performed to estimate the stabbing force and analyze stabbing mechanism of stabbing with different weapons.

**Materials and Methods**: Objective weapon characteristics (tip length-, height-, surface-, radius; blade length-, height-, and angle) were measured. Stabbing tests were performed with a Mecmesin MultiTest-dV material tester on pork loin and ballistic gel (Defensible Ballistics). The load (Force) and displacement curve was registered with Mecmesin VectorPro MT software. Penetration force (Fp) and maximal force (Fmax) were recorded and the registered force curves were analyzed.

**Results:** Fmax was 159.8-212.07 Newton (N), 30.56-30.58 N, 168.9-185.48 N for various knives; 171.39-190.43 N for the pair of scissors, 233.6 N for the fork; 532.65-562.65 N, 370.31-367.19 N and 314.51-432.89 N for various screwdrivers, 44.14-56.62 N for utility knife during pork loin stabbing. The butter knife, corkscrew, and rasp were not able to penetrate the pork loin, and the curved fork bent during stabbing.

**Conclusion:** Weapon characteristics greatly influence the force necessary for penetration. The maximal stabbing force depends mostly on tip sharpness. The force sharply decreases after penetration indicating, that tip characteristics are the most important factor determining the success of stabbing. The penetration force during stabbing with a pair of scissors is comparable to the penetration force of knives. Stabbing with screwdrivers generally needs larger force than average knives but depends greatly on screwdriver size.

# MODERN SUICIDE TREND FROM INTERNET

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**Introduction***:* The most common suicide methods vary slightly from country to country, partly related to the availability of effective means. Societal development over the years, and especially the advent of the Internet has enabled the sudden spread of new suicide methods. Recently, especially since 2019, intentional sodium nitrite poisoning has appeared on many social networks as an increasingly popular method of suicide.

**Material and Methods***:* There was performed a retrospective-prospective study of the autopsy protocols of the Medico-Legal Departments of the Healthcare Surveillance Authority in Slovakia, in a period of 15 years (2008 – 2022). We performed the analysis of cases of death due to nitrite poisoning, focusing on cases of intentional self-harm. In all selected cases, we present complete information, including photo documentation from the place of death, as well as the results of the performed autopsy and the results of additional laboratory examinations.

**Results***:* We did not record any fatal cases of unintentional, accidental consumption of sodium nitrite in Slovakia, nor any fatal cases of homicidal poisoning by this substance. However, there were a total of 3 cases of intentional self-harm (completed suicide) by sodium nitrite poisoning (in 2019, 2020 and 2022).

**Conclusions***:* The correct diagnosis of the cases of sodium nitrite poisoning deaths is possible only on the basis of evaluating all the information obtained, a thorough examination of the body and the crime scene, and the correct interpretation of the findings found during a subsequent autopsy and the results of the toxicological analysis.

# VIRTUAL FRACTOGRAPHY: ACCURACY OF MICRO-CT IN DETECTING BUTTERFLY FRACTURES

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**Introduction**. Biosseous leg fractures are frequently encountered in car accidents involving pedestrians and vehicles; due to bending forces, they often present a triangular fragment, taking the name of butterfly fractures. Morphological analysis of external and internal fracture surfaces is crucial in impact dynamic reconstruction.

The aim of the study was to analyze experimentally produced leg fractures with both fractography (gold standard) and micro-CT (virtual fractography), to calculate accuracy of the latter with respect to the former and to assess whether virtual fractography can be a valid alternative to the gold standard.

**Materials and methods**. 55 amputated human legs were impacted perpendicularly on their halfway point using a three-point bending experiment. We obtained 92 fractured bone samples that were analyzed both in fractography and in micro-CT, observing external surface fracture morphology and internal surface features (bone mirror, bone hackle, wake feature, arrest ridges, cantilever curl).

**Results**. At least one fracture was produced in all legs, allowing analysis and impact reconstruction. In external surface analysis, micro-CT posed the same morphological diagnosis as fractography, although detecting a higher number of incomplete butterfly fractures. In internal surface features analysis, micro-CT accuracy was equal (arrest ridges) or slightly lower (other four parameters, with a minimum of 0.79 for bone hackle), but nevertheless very high.

**Conclusions**. The present study proved that micro-CT is a reliable, fast, non-destructive method in the analysis of external and internal morphological features of biosseous leg fractures. For this reason, virtual fractography can be used as an alternative to the gold standard.

# IMPACT OF REGULATORY CHANGES IN CRIMINAL PROCEDURE ON THE STRUCTURE OF FORENSIC MEDICAL EXAMINATIONS OF LIVING PERSONS AND CORPSES IN LATVIA 2018-2022

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**Introduction:** The State Centre for Forensic Medical Examination (SCFME) is the only institution in the country that organizes and ensures the completion of forensic medical examinations of living persons and corpses. In 2018, amendments were made to the Criminal Procedure Law (CPL), which excluded the legal framework for determining the mandatory forensic examination for the determination of the cause of death, the nature and severity of personal injuries, as well as if there are signs indicating that a sex crime has been committed.
The aim of the work was to analyze the dynamics of forensic examinations and changes in the structure within a period of 5 years after making amendments to the CPL.

**Material and methods:** The study uses the data of the SCFME register of forensic examinations and expert conclusions for the period from 2018 to 2022.

**Results:** During 2018-2022, a total of 33917 examinations were performed, of which 37% were of deceased and 73% of living persons. A total of 12,068 autopsies were performed, of which there were 46% violent deaths, 42% non-violent deaths, 12% cases without possibility to determine the type and cause of death. Starting from 2019, a decrease in the number of examinations was observed, but in 2022 the number of examinations of living persons increased again, which, compared to 2021, increased, but did not surpass the period of 2019 and 2020.

**Conclusions:** One of the significant aspects influencing the number of examinations was probably the amendments made to the CPL in 2018. In the opinion of a forensic expert, such legal framework poses risks for the qualitative investigation or non-detection of crimes in cases of violent death or suspicion thereof.

## THE USE OF ARCHIVED PARAFFIN TISSUE BLOCKS IN FORENSIC DNA ANALYSIS

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**Introduction:** Formalin fixed paraffin embedded tissue is valuable source for prospective and retrospective biomedical researches and as material for forensic investigation such as identification, paternity testing and other kinship analysis. In this study it was investigated the effect of formalin fixation and effect of paraffin embedding on DNA quality (yield, purity and integrity).

**Materials and methods:** Lung tissue obtained from healthy people who suddenly died a violent death (homicide, suicide or accident) was fixed in 10% buffered formalin 24h, 48h, 72h, 5, 10, 14 and 28 days. Also the same tissues were fixed in formalin and embedded in paraffin block and stored from 1 to 12 years. Yield and purity of the DNA samples isolated from these tissues was measured using FastGene NanoView Photometer. The PCR amplification on a Thermal Cycle Bio-Rad CFX96 of the hTERT gene was performed to evaluate DNA integrity.

**Results:** Although the purity of the DNA isolated from almost all tissue samples is satisfactory, the DNA yield has decrease during the formalin fixation. There were decrease in successful PCR amplification of the hTERT gene in DNA samples isolated from fixed tissue was from 100% to 40 %, while for DNA isolated from paraffin blocks was smaller from 100% to 60 %.

**Conclusion:** Effect of formalin fixation has greater impact on DNA quality especially on DNA integrity, than paraffin embedding and length of archiving. If tissues are fixed for shorter time up to 72 h, and then paraffin embedded, DNA isolated from these tissues can be used for further molecular analyses.

# POSTER

## SUICIDE BY DROWNING WITH GENITAL SELF-MUTILATION: CASE REPORT

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**Introduction:** A multitude of signs allowing for self-injury and foul play differentiation is at forensics' disposal. However, when people choose extreme self-harm, we have to rely heavily on circumstantial and negative forensic evidence. We present a dramatic case of suicide by drowning preceded by genital self-mutilation.

**Materials and methods**: Crime scene examination, medical record and autopsy report review. Results: Naked body of a 32-year-old male was recovered from a 10-meter-deep well located in a yard of a secluded private house. His penis and testicles were traumatically amputated. A rope, the other end of which was fastened to a 4-meter-long anchor chain that was also submerged, was firmly tied around his neck. There was foaming at the mouth and nostrils indicating that the decedent was breathing at the moment of immersion. A bloodstained power saw, amputated genitalia of the decedent and his folded clothes were found in the yard. The decedent had an untreated mental illness. It was established by the police that the he had no criminal record or enemies and was alone at the place. On autopsy amputation wound and strangulation mark both demonstrated vital reaction, signs of drowning were positive and signs of circulatory shock in internal organs were present. No alcohol or illicit drugs were found in biological fluids.

**Conclusion:** This case illustrates how the cause of death can be multifactorial and the differential between suicide and homicide has to rely not only on autopsy findings but also on the developments of the police investigation.

**BEYOND THE VIRUS: EXAMINING THE IMPACT OF COVID-19 ON VIOLENT FATALITIES**

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**Introduction:** The COVID-19 pandemic had a significant impact on various aspects of society, including crime rates. In Serbia, it is important to examine the changes in violent deaths before and during the pandemic to inform public health and safety policies.

**Materials and Methods:** This is retrospective, epidemiological, cross-sectional analytical study of medico-legal autopsies in Central Serbia. First group were forensic autopsy cases examined from January 2017 to December 2019 (151 cases) and second group included cases of violent deaths during COVID 19 pandemic from January 2020 to December 2022 (192 cases). Natural deaths, skeletal remains, and undetermined cases of death were excluded from our sample.

**Results:** The data show an increase in the total number of incidents reported from 152 in before period to 191 during period. The proportion of incidents involving males remained relatively stable at around 70%, while the proportion of incidents involving females increased. There was no statistically significant change in the proportion of accidental deaths, while the proportion of homicide as well as suicide deaths increased. The results show a statistically significant association between gender and incident type for both periods. Deaths due to domestic violence have increased by 22.2% during the pandemic, which is cause for concern. In terms of demographic characteristics, males and younger individuals were more likely to be victims of violent deaths both before and during the pandemic.

**Conclusions:** The COVID-19 pandemic had a significant impact on violent deaths in Central Serbia, with an overall increase in the number of violent deaths and a major impact on deaths due to domestic violence. Policies to address domestic violence should be prioritized during the pandemic and beyond, and strategies should be developed to mitigate the effects of future pandemics or lockdowns.

# HOMICIDE STAGED AS A CAR ACCIDENT

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**Introduction:** We report the case of a 78-years-old man found dead in an irrigation ditch, supposedly after a car accident, vehicle driven by man's stepson, who raised the alarm at least 20 minutes after the man fell into the water. The car was leaning on its right side (passenger side), with the door open, partially submerged in shallow water (50 cm).

**Materials and Methods:** Investigations included: scene inspection, autopsy, histopathology, GCMS (gas chromatography mass spectroscopy) on body fluid samples and a total body Computed Tomography Scan.

**Results:** Site inspection acknowledged that the body was wearing clothing and shoes but no trousers, which were found on the ditch bank, properly fastened; besides, the driver seat and the steering wheel showed mud and plant traces. The CT excluded any skeletal or organ traumas. The autopsy and histopathology exam showed clear signs of drowning, in absence of any prior diseases. The toxicology resulted negative for exogenous substances, meaning that the victim wasn't under the influence of drugs or alcohol. Furthermore, from the circumstantial evidence it was noted that the adopted son, designated as universal heir, had just learned that the old man was getting married.

**Conclusion:** The autoptic-histological findings, associated with the low water level in the ditch, located in an agricultural land away from the public road, led to conclude that the car accident was badly staged, being instead a murder.
The stepson, after the judicial interrogations and being confronted with the acquired evidence, eventually confessed the homicide, thus receiving a life sentence.

## VEHICULAR HOMICIDE OR CARDIOVASCULAR ACCIDENT? THE IMPORTANCE OF THE AUTOPSY FINDINGS

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We present the case of T.L., a 61 years old woman with history of chronic obstructive pulmonary disease, hypercholesterolemia and sporadic episodes of tachycardia, who was hit by a car. After being carried to the closest Emergency Room, a CT-scan showed the presence of fractures of basin, pelvis and right femur head. The orthopaedic posed indication for hip replacement surgery but, the next day, her clinical condition was aggravated by the onset of an acute coronary syndrome. Therefore, she underwent coronary angioplasty surgery with placement in the common trunk of a drug-releasing stent. In the next days her clinical condition progressively improved. After 5 days there was the onset of another episode of acute coronary syndrome, also surgically treated. After another 10 days, given the stabilization of the cardiac condition, she underwent total right hip replacement surgery. After 1 hour from the end of surgery, an episode of asystole caused the death of the patient.
At the autopsy, there were relevant findings of chronic ischemic heart disease associated with a recent myocardial infarction, sclerotic scars resulting from previous myocardial infarction and moderate aortic atheromasia. We concluded that the cardiac events during the hospitalization period should be causally traced back to the cardiac stress determined by fractures and, therefore, the car driver should be considered accountable for the death of T.L. This case-report shows the importance of a complete autopsy and how, like in this case, it can be helpful in the distinction between vehicular homicide and a spontaneous cardiovascular event.

# PLASTIC BAG SUFFOCATION AND CODEINE OVERDOSE: AN UNUSUAL CASE OF COMPLEX SUICIDE

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**Introduction:** The term "planned complex suicide" refers to cases where two or more suicide methods are applied simultaneously. Plastic bag suffocation is a suicidal method commonly combined with self-poisoning by inhalation of volatile compounds or pharmacological substances at poisoning dosage.

**Materials and methods**: A 67-year-old woman was found dead on the couch. The head was wrapped in a plastic bag knotted at the front of the neck. No signs of struggle were present on the scene. In the fireplace, there were two blisters of acetaminophen/codeine phosphate tablets. Postmortem examination showed congestion of the face and the neck and pulmonary edema with patchy emphysema. There was no evidence of physical duress. Toxic levels of codeine were detected in the blood, and DNA testing performed on the bag confirmed the presence of the victim's moisture inside.

**Results**: Pulmonary edema is a common autopsy finding in deaths due to plastic bag asphyxia. Some cases of codeine overdose-induced pulmonary edema have been described in forensic literature. The hypoxic/cardio-inhibitory effects of plastic bag suffocation combined to codeine-induced deep reduction of respiratory rate, making the suicide hypothesis the more likely scenario.

**Conclusion:** The death was related to a complex suicide involving codeine overdose and asphyxia by plastic bag suffocation. The determination of the manner of death can be particularly difficult in cases of plastic bag suffocation. Although pulmonary edema is a common finding in hypoxic deaths, a careful inspection of the scene and drug analysis play a crucial role when suicide is strongly suspected.

# CARBON MONOXIDE POISONING IN PUTREFIED CORPSES: A DIFFICULT DIAGNOSIS

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**Introduction:** Carbon monoxide (CO) poisoning is frequently encountered in forensic practice. The diagnosis typically relies on the observation of characteristic autopsy findings and the analysis of carboxyhemoglobin (HbCO) concentration in peripheral blood. What happens, however, when dealing with putrefied corpses? The authors present a case of death by CO poisoning in a couple found at home in advanced stage of decomposition, where distinguishing between suicide and accident was particularly challenging.

**Case Report:** The bodies belonged to a 79-year-old man and his 76-year-old wife. Their clothing was intact. No suicidal notes were found on the scene. The autopsy and CT examination excluded the presence of traumas. A cardiac histological examination showed signs of chronic coronary artery disease in both individuals. During the on-site inspection, a tampered boiler was discovered in the bathroom, but it was unclear whether it was intentionally rigged.

**Discussion:** The toxicological analysis conducted on the blood of the best-preserved corpse showed a HbCO level of 29.98%. However, it should be noted that this non-fatal value may be underestimated due to the putrefactive process; moreover, the fatal threshold could be lower in elderly individuals and those with underlying heart conditions.

**Conclusions:** The cause of death was determined to be CO poisoning. The manner of death was accidental. Diagnosing CO poisoning in putrefied corpses is very difficult, therefore further studies are needed to accurately identify HbCO levels in putrefied biological samples. Also, a comprehensive analysis of the crime scene is crucial for determining the manner of death in such cases.

# POSTMORTEM CONCENTRATIONS OF DOPAMINE IN CEREBROSPINAL FLUID REGARDING THE MANNER AND CAUSE OF DEATH

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**Introduction:** Dopamine (DA) is a neurotransmitter important in controlling of motor function, movement, in learning and motivational process, and in affective behavior. It has a significant role in acute stress response and is released during any trauma. The aim of this work was to analyze postmortem levels of DA in cerebrospinal fluid (CSF) and render its possible profiles regarding different manner and cause of death.

**Materials and methods:** The samples of CSF were obtained following standard autopsy procedure. The method of derivatization by ethyl chloroformate and liquid-liquid extraction by ethyl acetate was applied to the samples, then analytical LC-MS/MS technique was performed.

**Results**: Levels of DA were analyzed regarding cause and manner of death and characteristics of deceased. Levels of DA were significally higher in women. No significant difference was found regarding age, postmortem interval (PMI), duration of agony and victims awareness of impending lethal outcome even an apparent decline in values was noticed in the elderly and an increase along PMI. There was high statistical difference between DA levels in natural and violent deaths ($p<0.05$) – much higher in violent deaths, with determined cut-off value above 0,24 ng/ml. Further difference in subgroups of violent death (accident, suicide, homicide) was not found. Some remarkable differences were found regarding causes of death but were not statistically significant ($p > 0.05$).

**Conclusions**: Dopamine level in CSF as a marker of stress could be an useful tanatochemical marker in distinction of violent and natural deaths.

# THE IMPACT OF COVID-19 PANDEMIC ON VIOLENT DEATHS

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**Introduction:** The effects of the COVID-19 pandemic on non-natural manners of death and understanding of the indirect consequences of the pandemic and related public health measures (i.e. lockdown) could be important for practice in public health. The aim of this study is to examine the impact of the COVID-19 pandemic on the characteristics and frequency of violent deaths.

**Materials and methods**: The study was designed as a cross-sectional study comparing characteristics and frequency of violent deaths during the one year period before and after the pandemic onset, as well as during lockdown period in 2020 (56 days) versus the cases during the analogue period in 2019.

**Results:** The violent deaths participate with 34.44% (423/1228) in the one year period before and 39.72% (454/1143) cases in the one year period after onset of COVID- 19 pandemic, respectively. During the 56 days of lockdown, there were 40.17% (47/117) violent deaths, while in the same period year before they participated with 26.86 % (54/201). The prevalence of homicides was higher in both analyzed periods of the pandemic. During the lockdown period, the frequency of accidents was higher, while the frequency of suicides was lower than in the similar period of the previous year.

**Conclusions:** According to our results, the pandemic affected a higher overall frequency of homicides in both examined pandemic periods and a higher number of accidental deaths during the lockdown period. No impact of the pandemic on suicide deaths was observed.

# IMPORTANCE OF THE DETAILS IN PERSON IDENTIFICATION

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**Introduction**: In this suicide case report the remains of a young women were found alongside of a railway line by a co-worker of a Hungarian National Railway. Before the autopsy the police had idea who was the victim (suicide note was also found at her home - later forensic handwriting expert confirmed it was written by her) but they asked to do the dissection as a case of an unknown person.

**Materials and methods:** We got an extremely destroyed corpse of a young women into pieces. Beside of a general autopsy findings we focused on possibilities as we used to identify an unknown person.

**Results and conclusion:** The face were skinless. Additional severe damage were found throughout the body and the special identifying markings were the following: extra nipple on the left side, a „rainbow" tatto on the left forearm, a „flower garland" tattoo on the left thigh, breast implants with serial number (seperated from the body), implant of the 26 teeth (upper left quadrant), a separated, injured right sided brownish/blackish eyeball. Almost all of the evidences were proper but the color of the eye was different and the mother of the persumed victim (originally she had bright blue eyes) denied that the decesad was her child. Sample (femur bones diaphysis) was taken for DNA examination.

**Conclusions:** The color of the eye itself is not proper for the person identification because it can change after death especially in the case of blue eyes. The result of the DNA examination proved the supposal of the victim identity.

# DRUG-FACILITATED SEXUAL ASSAULT FOLLOWED BY FEMICIDAL CHLOROFORM POISONING AND SUFFOCATION: A CASE-REPORT OF CRIMINAL RESPONSIBILITY

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**Introduction:** Femicide by inhalational chloroform intoxication has been rarely described in literature and might correlate to a forcible external suffocation due to occlusion of the respiratory orifices by means of a chloroform-soaked soft covering. We present a case-report of a drug-facilitated sexual assault followed by chloroform poisoning and suffocation.

**Materials and methods :** A.S., a 30-year-old female, was found dead in the house of S.P., a 50-year-old male. S.P. told the police that he had killed A.S. by forced chloroform inhalation when she had experienced clouded sensorium as a result of an involuntary ingestion of Zolpidem, a hypnotic agent, mixed with alcohol. A multidisciplinary approach was adopted to solve the case; indeed, autopsy was performed by a forensic pathologist, a digital forensics examiner analysed several electronic devices, and 4 criminologists evaluated the mental state of S.P. at the time of the crime.

**Results and conclusions:** Autopsy, histological and toxicological examination were performed. The cause of death of A.S. was identified as a lethal chloroform intoxication in altered consciousness caused by Zolpidem, whilst a homicidal suffocation was also described. Digital evidence was extracted complying with the chain of custody; mobile forensics demonstrated that S.P. had videotaped the crime scene, clearly revealing that A.S. had been sexually assaulted by S.P. before dying. Criminal responsibility of S.P. was evaluated through psychological tests and interviews with the accused; specialists concluded that S.P. could not be exempted from being responsible for the homicide.

# APPLICATION OF THERMAL IMAGING IN FORENSIC PATHOLOGY: INSIGHTS FROM TWO REAL CASES.

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**Introduction:** In order to estimate the postmortem interval the gold standard relies(PMI) on body cooling measurement, but advancements in thermal imaging arise new opportunities. This study explores two real cases using a portable thermal camera during on-site investigations and external examinations. The aim is to assess temperature variations for thanato-chrono-diagnostic purposes and explore additional forensic applications.

**Materials and Methods:** The study examined two cases within a single institution. Thermal camera photos were taken during on-site investigations and external examinations before refrigeration. The Blackview BV6600 Pro phone with an integrated FILR Lepton thermal camera was used, operating within -10 to 140 °C with an error margin of ±5%.

**Results:** The first case involved a 50-year-old Caucasian male who died by atypical complete hanging. The thermal camera identified stationary areas, traces of urine, and temperature differences between clothed and exposed body parts. Mucous membranes exhibited increased cooling, while the groove and mantle-shaped livor mortis appeared thermally distinct.
The second case examined a 45-year-old woman who died by a fall and subsequent cranial trauma. Hypothermal regions were observed in exposed subcutaneous tissue and the eyes, while the abdomen showed hyperthermal characteristics due to hemoperitoneum.

**Conclusion:** Portable thermal cameras offer potential in forensic pathology, enabling more accurate temperature measurements during on-site investigations. Additionally, they can objectively assess hyperthermal injuries in both the deceased and the living. Further comprehensive studies are needed to fully explore the potential applications of thermal imaging in forensic practice.

# UNVEILING THE CALCULATED BRUTALITY: A FORENSIC CASE REPORT ON A HOMICIDE INVOLVING MULTIPLE MECHANISMS OF INJURY

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**Introduction**: This case report presents an uncommon instance of homicide involving the utilization of two distinct mechanisms of injury. The calculated and severe nature of the inflicted injuries highlights the assailant's brutality.

**Materials and methods**: A thorough examination was conducted on the body of a 70-year-old male victim discovered in the hallway of his residence. The victim was found with partially burned clothing and carpet around him, accompanied by blood spatter in the vicinity of the crime scene. At the Institute, a standard medico-legal autopsy was performed.

**Results**: Postmortem analysis revealed putrefactive changes and second to fourth-degree burns on the chest, upper extremities, and posterior regions of the lower extremities. Additionally, a total of 15 stab wounds were identified on the chest, three on the abdomen, and four on the left arm. The characteristics of the stab wounds suggest the use of a single-bladed knife, although the precise murder weapon could not be identified. The fatal wound penetrated the right ventricle of the heart, but the initial cardiac damage allowed the victim limited mobility. The vital reaction exhibited by the burns confirms their antemortem infliction, further indicating the offender’s intention to cause the victim's death.

**Conclusion**: The combination of multiple sharp penetrating trauma and burn injuries strongly supports the intentionality of the homicide. The examination of the crime scene, autopsy findings, and injury analysis yield valuable insights into the brutal nature of the crime, underscoring the necessity for comprehensive psychological and psychiatric evaluation of the perpetrator.

**Keywords: homicide; stab wounds; thermal injury; burns; brutality**;

# THE ROLE OF ETHANOL IN A CASE OF COMPLEX SUICIDE INVOLVING DROWNING IN A DIABETIC WOMAN

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**Introduction:** A complex suicide is defined as a recourse to multiple methods of potentially lethal mechanisms to commit a single suicide. The role of ethanol in these incidents has been object of debate, with many authors affirming that it is often taken to avoid pain and suffering and not for self-killing.

**Case description:** The non-putrefied body of a 56-years old woman was found in the Isonzo's river bank; the corpse was identified by Police as, from the previous afternoon, the victim resulted disappeared. The body was found prone, with the legs in the water and foam exuding from the airways; an empty whisky bottle was found near the corpse together the victim's bag, containing some insulin pen needles and a farewell letter.
At autopsy aqueous emphysema in the lungs, liquid foam into the distal airways and limpid and alcoholic liquid in the stomach were noted; toxicology highlighted a blood alcohol concentration (BAC) of 4.37 g/L. These findings where suggestive of a complex suicide involving drowning and alcohol intoxication.

**Conclusions:** BAC higher than 3.5 g/L is suggestive of a fatal intoxication. However, in the present case post-mortem ethanol production (PMEP) had to be considered, since the victim was diabetic and her body was recovered from a watery environment.
Although alternative-to-blood specimens were not available, the absence of putrefaction and the fact that the victim had been seen alive <24 hours before made the hypothesis of PMEP unlikely. Therefore, it was plausible that ethanol had been consumed to commit suicide.

## A SUSPECTED TRAUMATIC BRAIN INJURY: MURDER OR ACCIDENTAL EVENT?

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**Introduction:** finding a body presenting signs of multiple head trauma requires the forensic pathologist to conduct a detailed and complex examination; multidisciplinary analysis is often necessary. We report a case where the corpse of 60-years old man was found lying prone on the floor of his apartment, half-naked and in a puddle of blood mixed with vomit.

**Materials and Methods:** on-site inspection, post-mortem examination, histological and toxicological analyses were performed.

**Results:** The third-floor apartment was in complete disarray, with door and windows locked from the inside. Traces of blood indicating dragging and crawling were mainly located on the floor but also on the furniture, refrigerator, and walls in two rooms of the apartment. Another room showed evidence of vomit without any blood traces, and various drugs, including benzodiazepine, were discovered. External examination revealed multiple lacerated wounds and bruises on the skin of the skull. Complete post-mortem investigation revealed a linear cranial fracture on the left occipital bone and a fracture of the fourth cervical vertebrae; moreover, an acute subdural hematoma covering the right cerebral hemisphere was found. Histological analysis revealed cerebral hemorrhages, massive myocardiosclerosis, pulmonary edema and hepatic steatosis. Toxicological blood analysis revealed a positivity to bromazepam, venlafaxine, and a small amount of alcohol.

**Conclusions:** In the presented case, multiple forensic evidence pointed toward a homicide. It was only through a multidisciplinary approach and the investigative efforts of the police that the manner of death could be identified as accidental.

# A CASE OF COMPLEX ASPHYXIA SHEDS LIGHT ON PROBLEMS IN THE CLASSIFICATION OF ASPHYXIAS

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**Introduction:** Death from positional asphyxia is often an accidental event occurring when the victim's body assumes a position which can compromise an effective respiration. Its diagnosis is usually not simple, because it needs to know the exact circumstance in which the body was found and the original positioning of all the body segments.

**Case description:** In this case, a 41-year-old man with a history of opioid drugs abuse was found dead in a knee-chest position; the head was down on the floor with the face resting on a plastic bag. Pictures of the scene of death was taken while the body was still in its original position. Following the autopsy examination, completed by histological and toxicological examinations, the cause of death was determined as postural asphyxia secondary to intoxication by methadone, in the presence of chronic ischemic heart disease.

**Discussion:** Some features of this case, moreover, were typical of the death in head down position and the prolonged knee-chest position was also associated with a passive smothering through the plastic bag, which may have both contributed to the asphyxiation. In situations like this one, it is extremely difficult to identify a single mechanism of asphyxia.

**Conclusion:** These cases of "combined" asphyxia represent a challenge for the classifications of asphyxias, which are very variable and not standardized. The elaboration of new systems of classification of asphyxias, which must be clear, simple and shareable, is necessary to avoid confusion in categorizing cases that present overlapping between several types of asphyxiation modalities.

# SUICIDAL HANGING INSIDE AN AUTOMOBILE

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**Introduction.** Suicidal hanging inside motor vehicles is unusual. To our knowledge, very few cases have been reported in literature. An atypical and incomplete hanging inside an automobile has described.

**Materials and methods.** Crime scene investigation, a complete autopsy and toxicological analysis were performed in the case of a 65-year-old male found dead inside his automobile, whose doors were closed and locked, lying on reclined driver's seat with a scarf around both his neck and the headrest.

**Results**. The man was found with the lower left leg flexed on the abdomen and the foot pushed against the dashboard. Inside the car, an empty bottle of whiskey and a bottle containing petrol were found. The surveillance video cameras recorded the vehicle in the parking area all time long and nobody else except the victim was inside the car. At autopsy the furrow showed a pale-yellow parchment appearance, and it did not completely encircle the neck. No other classic signs of asphyxia. Toxicological analysis showed alcohol in blood (1.1 g/L).

**Conclusion** According to similar cases reported in literature all victims were male and age range was from 23 to 67. In all cases the furrow was shallow, broad and encircled incompletely the neck. No classic signs of asphyxia have been observed, consistent with a death caused by a vasovagal reaction or by a compression of the blood vessels of the neck more than the obstruction of the airway.

# TOOTH AND BONE AS A CAUSE OF DEATH IN DROWING: a New Diagnostic Procedure in Forensic Medicine Practice

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**Introduction**: In cases of drowning victims, diatom tests are not commonly employed during autopsies. Instead, experts rely on macroscopic examination by the pathologist. Due to the limitations of these methods, it is often insufficient to establish a diagnosis. The aim of this study is to optimize the "Diatom Test" method in forensic medicine in Bosnia and Herzegovina.

**Methods**: The study was conducted as a prospective experimental, randomized study using albino Wistar rats as the model at the Veterinary Faculty of the University of Sarajevo. A total of 32 adult albino rats, were included in the experiment and divided into groups as follows: Group A (eight deceased rats with causes of death other than drowning, but due to mechanical asphyxia, which was then submerged for 1 hour after death); Group B (eight deceased rats with causes of death other than drowning, but due to mechanical asphyxia, which was then submerged for 72 hours after death); Group C (eight rats that were immediately autopsied after drowning, with the cause of death determined as drowning); Group D (eight rats that underwent a 48-hour postmortem period after drowning). We compared results with microscopic analysis.

**Results**: No diatoms were found in Groups A and B. However, diatoms (Denticula kützingii, Cocconeis placentula, and Gomphonema minutum) were found in Groups C, D, and E.

**Conclusion:** Optimization of the "Diatom Test" method could potentially lead to its future use as a routine method within experimental settings. This experimental study is a starting point that guides us towards the optimization of tests and sampling in cases of unexplained etiology, where preserved soft tissue structures are not available during autopsy, and teeth and bones serve as accessible materials for diagnosing the cause of death, alongside standardized nonspecific findings in the absence of organs for micro and macroanalysis.

**Keywords**: **drowning, forensic, death, asphyxia, teeth, bone**

# BREAST REDUCTION SELF-SURGERY: CASE REPORT

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**Introduction**: people resort to self-surgery due to extreme financial, legal or social circumstances. Whatever the reason, the results can be devastating. We present a self-surgery case that posed a multi-optional differential diagnosis enigma. Materials and methods: crime scene examination, medical record and autopsy report review.

**Results:** A 27-year-old female was found dead in a bathtub filled with water. Shocked relatives failed to recall if the face was immersed. There was foaming at the mouth and nostrils, fresh, apparently surgical incisions and stitches on both breasts. Scalpels, surgical scissors and threads, syringes and empty local anaesthetic vials were nearby. Stitch tension indicated that skin flaps and soft tissues had been removed. Absence of the removed tissues, blood-soaked gauze or any blood at the scene suggested involvement of someone else, however the police established that the woman was alone in her flat, leading to the conclusion that a self-surgery (mammoplasty) had been attempted. The deceased had a history of psychiatric admissions, previous suicide and self-surgery attempts. On autopsy organs and tissues were anaemic. Non-steroid and opioid analgesics were recovered from breast tissues, blood and urine of the deceased. Forensic diagnosis was a challenge due to distinguishing between drowning, pain and acute anaemia-related traumatic shock and medical poisoning. Based on gross, histologic and toxicologic examinations the diagnosis of medical poisoning was established. Conclusion: This case brings to light the differential diagnosis issue in forensic medicine and refutes the widespread misconception that the cause of death can be established unambiguously in 100% of cases.

# INTIMATE PARTNER FEMICIDE: MEDICO-LEGAL AND EPIDEMIOLOGICAL INVESTIGATION AT THE INSTITUTE OF LEGAL MEDICINE OF PADUA (ITALY) AND FREIBURG (GERMANY)

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**Introduction.** Women's main risk of homicide is from an intimate partner, introducing the term "intimate partner femicide" (IPF). Actually, there is a lack of studies focusing on IPF. Therefore, the present study aims at analyzing and comparing the socio-demographical and medico-legal characteristics of IPF cases assessed at the Institutes of Legal Medicine of two European countries, in order to identify risk predictors for IPF.

**Materials and methods.** A retrospective analysis of 82 IPF cases assessed at the Institutes of Legal Medicine of Padua (43 cases) and Freiburg (39 cases) over the period 2000-2022 was conducted. Characteristics of victims and perpetrators, as well as post-mortem data were extracted. A logistic multivariate analysis has been performed.

**Results.** The only relevant difference between the two groups concerns the manner of death. Particularly, we found that women were mainly killed by firearms in the Padua district and by asphyxiation in the German district. On the other side, in both groups it was observed an association between age and suicide of the perpetrator, previous violence against women and number of external injuries, former relationship and multiple homicide, actual relationship and indoor homicide, firearm-related homicide and suicide of the perpetrator or multiple homicide, indoor homicide and finding of the murder weapon.

**Conclusions.** This study shows that risk predictors for IPF in Italy and Germany are similar, suggesting that this type of crime has distinctive characteristics regardless of the geographical context in which it occurs. Therefore, prevention strategies focused on the peculiarities of IPF should be implemented internationally.

## A NON-FATAL THC POISONING OF A 2,5-YEAR-OLD BOY – A CASE REPORT

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**Introduction**: A 2,5-year-old boy was admitted to the Emergency Department of Paediatric Clinic in Ljubljana because of consciousness disturbance. The symptoms presented at around 7 p.m. on the day of admittance with drowsiness, staggering gait and vomitus. The boy was otherwise healthy, he was once hospitalized for laryngitis and had no known allergies. His grandfather, with whom he stayed with when the symptoms presented, had schizophrenia and was taking biperiden, venlafaxine and sulpiride.

Blood tests on admittance did not show any abnormalities, they also performed an MRI scan in general anaesthesia that showed wider liquor spaces along the optic nerves and flattened papillae, which were not evident when he was checked by an ophthalmologist.

**Materials and methods**: Samples of urine and blood were sent to the Toxicology Laboratory of the Institute of Forensic Medicine in Ljubljana. After immunochemical screening, the samples were analysed by gas chromatography-mass spectrometry (GC-MS) and liquid chromatography-tandem mass spectrometry (LC-MS/MS).

**Results:** Immunoassay screening of urine gave positive result for THC metabolite 11-COOH-THC. Analyses by GC-MS and LC-MS/MS confirmed the presence of THC and its psychoactive metabolite 11-OH-THC.

**Conclusions**: The boy has recovered fully during a 2-day observation period. The direct source of THC poisoning has not been identified, however, the toxicological analyses revealed that the most probable cause of poisoning was accidental ingestion of a THC-containing product.

# A MULTIDISCIPLINARY APPROACH FOR EVALUATING AN ATYPICAL CONCEALMENT CASE REPORT

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**Introduction**. In cases involving concealed cadavers, the evaluation of the cause and manner of death becomes complex due to body manipulation and the advanced stages of putrefaction commonly observed.

**Material and methods**. During the COVID-19 pandemic lockdown, the police discovered the decomposed remains of a 40-year-old woman concealed with a plastic sheet in the bathtub of her home. Her cohabitating father stated he found the corpse hanging from a rope a month earlier and choose to retain the body due to emotional attachment. The man was then admitted to the psychiatric ward. Forensic pathology investigations are conducted to identify cause and manner of death. Moreover, a collaborative analysis conducted with forensic psychiatry specialists examine the factors that might have influenced the father's decision not to report his daughter's death and the manner in which the body was handled.

**Results**. Autopsy and histology investigations were limited due to the advanced putrefaction. The micro-Computed Tomography allowed to recognize and characterize neck lesions showing bilateral thyroid cartilage's superior horns fractures. Toxicological and genetic analyses yielded negative results. Mechanical asphyxia due to suicidal hanging was determined to be the most probable cause and manner of death. Considering the unique circumstances of the situation, the father, who was diagnosed with a unspecified adjustment reaction, did not face charges for the offense of concealment.

**Conclusion**. A comprehensive, multidisciplinary approach, involving forensic pathology, genetics, toxicology, radiology and including psychiatry is essential for the determination of the cause and manner of death in cases involving suspected concealed cadavers.

# LETHAL THREAT IN THE USE OF GLASS DOORS AT HOME

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**Introduction:** The aim of present case report is to draw the attention to the potential threat in the use of glass door at home. When a person falls against such a door, a variety of injuries can occur ranging from a superficial incised wound to a deep life-threatening injury. Now we give an example for an injury affected the subclavian artery opened the chest cavity and led to the victim's exsanguination, haemothorax and death.

**Materials and methods:** After the possibility of homicide was excluded during the medical examination, autopsy was performed one day after the incident. We provided samples for histological examination, as well as blood and urine for toxicological examination.

**Results and conclusions:**

We found a stabbed-incised wound in the region of the clavicle which was proven to be opened the thoracic cavity and caused transection of the subclavian artery. In addition, further injuries were observed involving the right trapezius muscle, and the right I., II., III. ribs and their associated anatomical structures. Moreover, an injury to apex of right lung was seen and 800 ml of partially coagulated blood was observed in the right pleural cavity. The blood and urine alcohol tests were negative. The lethal outcome of the accident may have been caused by long shards of glass remaining fixed in the door after the glass had been broken, which draws attention to need to use glazing similar to that of car glass in such circumstances to avoid similar accidents.

# BURNING TEMPERATURE AND BONE MODIFICATION: THE CREMATION DYNAMICS

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**Introduction:** Burning a body is one of the best-known methods to conceal a crime. However, the combustion of human remains is one of the most complex phenomena to analyze both in archaeological and
forensic practices and determining the combustion temperature of a corpse can provide important information to the judicial authority. The aim of this study is to identify thermal changes in bones burned at pre-set temperatures.

**Materials and methods:** 100 cadavers undergone cremation were analyzed. Cremation temperatures ranged from 600 to
1200°C, whereas cremation time was monitored. Morphological and colour changes of the bones, the development of fire-related fractures and surface were studied, with specific attention to the long bones, the cranium and the vertebrae, in order to analyze bone response to thermal alteration.

**Results:** The study highlights, on one hand, the appearance of changes of the cortical surface of the bones,
the development of thermal fractures in the long bones, the deformation of flat and thin bones, and the presence of an opaque white colorization in all bones exposed to a combustion temperature higher then1000 degrees. Lower temperatures, on the other hand, seems to imply less alterations and a wider colour change spectrum, from grey to brown.

**Conclusions:** The macroscopic alterations observed on the cremated bones allowed to differentiate the
temperature intervals comprised between 600-900 and 900-1200 degrees.

# FORENSIC EPIDEMIOLOGICAL ANALYSIS OF SUICIDES IN THE REPUBLIC OF NORTH MACEDONIA IN THE PERIOD BEFORE AND DURING THE COVID-19 EPIDEMIC

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**Introduction:** In this study, we made an epidemiological analysis of the number, demographic characteristics, methods of committed suicides, the connection of suicides with psychiatric diseases and diseases of addiction in the period from 2018 to 2021. Thus, we had determined the impact of pandemic conditions on increasing the incidence of suicides in our country.

**Material and methods:**The study includes an epidemiological analysis of 222 suicidal cases in the RN Macedonia, autopsied at the Institute for Forensic Medicine in Skopje and the Clinical Hospitals in Bitola, Shtip and Tetovo, in the period from 01.01.2018 to 31.12.2021.

**Results:** Out of a total of 222 autopsied suicidal cases, 172 (77.48%) are men, and 50 (22.52%) are women. Average age for men is 51.4 years, and for women 47.9 years old. In the period 2018-2019, a total of 110 suicides were committed, and in the period 2020-2021, 112 suicides were committed. In 168 autopsied bodies (75.7%) there was a positive finding of high alcohol, opiates or benzodiazepines in blood and urine. The death rate from suicides in the RN Macedonia in the period before the Covid epidemic was 2.6 in 2018 and 2.9 in 2019, and during the epidemic it was 2.65 in 2020 and 2.95 in 2021, i.e. an increase of only 0.05.

**Conclusion**: RN Macedonia with an average rate of 2.77 per 100,000 inhabitants is counted among countries with a low suicide mortality rate. Diseases of addiction by persons appear as the most common etiological factor. The difference between the death rate, between 2018 and 2019 and during the 2020 and 2021 epidemic, of 0.05, indicates the fact that the pandemic did not influence the increase in the number of suicides.

# POSTMORTAL DARK SCLERAL SPOTS: INSIGHTS FROM A STUDY OF 905 CASES FROM A SINGLE INSTITUTION

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**Introduction:** Dark scleral spots (DSSs), areas of discoloration beneath the ocular surface, are a little-known and poorly studied phenomenon. This retrospective study aims to investigate the frequency and potential causes of postmortal DSSs.

**Materials and methods:** A total of 905 cadavers, spanning from 2007 to 2022, were examined at our institution. Two independent physicians thoroughly analyzed the iconographic material to identify the presence or absence of DSSs. Cases with uncertain findings or gray-pearl sclera color associated with bulbar deformation were excluded.

**Results:** DSSs were detected in 2.3% (21 cases) of the sample. Among these, approximately 86% were male and 14% were female, with a mean age of 40.1 years (± 11.9 years). The majority of cases (71%) exhibited unilateral DSSs, while the remaining cases (29%) showed bilateral involvement. No preexisting ocular pathologies were found in the clinical records. Autopsy revealed that 33.3% of the DSS cases resulted from violent mechanical asphyxiation due to hanging, 33.3% from acute hemorrhagic shock, and the remaining 33.3% from cranial-encephalic trauma. In all cases, the physicians observed varying degrees of palpebral fissure opening during the inspection.

**Conclusions:** In our series, DSS formation occurred in a small percentage of cases, primarily associated with violent mechanical asphyxiation, acute hemorrhagic shock, and cranial-encephalic trauma. These findings suggest that rapid changes in ocular pressure may contribute to DSS formation. Further research is needed to explore the underlying mechanisms

# ACUTE RIB FRACTURE DETECTION PERFORMANCE WITH DEEP LEARNING MODELS ON COMPUTED TOMOGRAPHY DATA OF BLUNT CHEST TRAUMA PATIENTS, A SYSTEMATIC REVIEW AND META-ANALYSIS

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**Introduction.** The overall sensitivity of rib fracture detection in computed tomography (CT) scans, which is around 70% for radiologists, can be enhanced with the assistance of deep learning models. This review analyses the diverse study designs in deep learning for rib fracture detection, their risk of bias (ROB) and the performance of their models.

**Materials and methods.** Research articles written in English were retrieved from PubMed, Embase and Web of Science in April 2023. A study was only included if a deep learning model was used to classify, detect or segment rib fractures, and only if the model was trained with CT data from humans. For the ROB assessment, the QUADAS-2 tool was used. Sensitivity and precision of acute rib fracture detection models were meta-analysed with forest plots.

**Results.** A total of 27 studies were selected, of which 23 performed rib fracture detection. Only 7 studies were included in the sensitivity meta-analysis, and only 6 were selected for the precision meta-analysis. The sensitivity of the subgroup of low ROB studies was 91.64 [89.93, 93.34] % with a heterogeneity of 53.2%. The precision of the studies with low ROB was 86.08 [82.75, 89.41] % with a heterogeneity of 67.8%. The ROB subgroup differences test for the sensitivity and precision meta-analyses lead to p-values of 0.11 and 0.01, respectively.

**Conclusions.** About a third of the studies introduce ROB by not reporting the patient selection criteria. The studies with low ROB have better performance in acute rib fracture detection using deep learning models.

# VEHICLE-ASSISTED LIGATURE STRANGULATION: CASE REPORT OF A BIZARRE SUICIDE METHOD AND LITERATURE REVIEW

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**Introduction**. Vehicle-assisted ligature strangulation is an extremely rare suicide method. We report a case of a 43-year-old man who attached one end of a nylon rope to a tree, fastened the other end around his neck and started his vehicle, leading to an incomplete decapitation. The rope was not found during crime scene investigation; hence policemen wrongly assumed it was a homicide.

**Materials and methods**. We performed a literature review of all the studies published on the major scientific search engines: only 14 cases of this unusual suicide method are described in literature and only one of which involved an incomplete decapitation. We analysed all available cases regarding victim's gender, possible decapitation, rope features (material, length, thickness) and its eventual breaking.

**Results.** 93,3% of victims were male. Complete decapitation occurred in 6 cases, incomplete decapitation in 2 cases, decapitation was absent in 7 cases. Length and thickness of the ropes were extremely variable. The materials included metal, nylon, and hemp. In both cases of partial decapitation, and in 4 out of 7 cases in which decapitation was not described, the rope was broken. Considering the cases in which complete decapitation occurred, none of the ropes broke.

**Conclusions**. Vehicle-assisted ligature strangulation is almost exclusively chosen by men, careful on-site inspection should be performed, to rule out other manners of death; rope features should be noted to compare them to the ligature mark and the possible decapitation since longer and more resistant ropes are more commonly associated to complete decapitation.

# SAY “CHEESE”: A STRANGE DEATH IN THE HEART OF THE FOOD VALLEY

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**Introduction:** On January 18th, 2011 the lifeless body of a male subject was discovered, inside a farm located in the Parma countryside, lying in a steel tank filled with whey. Furthermore, during the inspection operations, a rope tied in a noose was found in the backyard, hanging from a wooden beam above a ladder.

**Materials and methods:** To determine the cause and manner of death forensic investigations were conducted, including on-site inspection, autopsy examination, histological and toxicological investigations, as well as analysis of the subject's medical documentation.

**Results:** Analysis of the clinical documentation revealed a severe psychiatric pathology (psychotic delirium). The external examination showed the presence of multiple lacerated wounds in the peri-auricular area, and abrasions of the limbs, while hemorrhagic infiltration of the suprahyoid muscles and anatomopathological picture characterized by polivisceral congestion, blood fluidity and cerebral edema were detected on internal examination. Furthermore, the presence of caseous material was found during macroscopic examination of the lungs and bronchial tree. Histological investigation of the lungs revealed a pattern of ubiquitous congestion and acute pulmonary emphysema, with filling of bronchiolar and alveolar spaces by an amorphous material containing rod-shaped microorganisms (Lactobacilli).

**Conclusions:** After the analysis of all the obtained data, the cause of death was determined to be mechanical asphyxia resulting from the penetration of milk whey into the airways. The observed wounds suggested that the subject initially attempted hanging, and when that failed, resorted to a rather atypical form of drowning to end his life.

# INTERPRETATION OF THE PINK TEETH SIGN IN NON-SUBMERGED CADAVERS: A CASE SERIES.

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**Introduction:** The pink teeth sign refers to the distinct discoloration observed in dental elements, typically associated with the cadaver being submerged in water for at least 15 days or with deaths resulting from significant facial trauma. This phenomenon is believed to be linked to the degradation of hemoglobin in a particularly humid environment, with its passage through the dental sockets.

**Materials and Methods:** In this study, we examined five cases of cadavers that had not been submerged in water and had no peri-mortem facial trauma, yet exhibited the pink teeth sign.

**Results:** The cases consisted of four males and one female, with an average age of 44±8 years. The causes of death included gunshot wounds to the chest in two cases, acute cardiac failure in two cases, and acute drug intoxication in one case. The affected teeth were incisors and canines in 60% of cases, while premolars and molars were involved in the remaining 40% of cases. The postmortem interval was 27.8±22.4 days.

**Conclusions:** As recent studies stated, the decomposition of a cadaver in specific (humid) environments can lead to the occurrence of the pink teeth sign. In some cases, we observed its manifestation at an earlier stage than reported in the literature (6-8 days). These findings indicate that the sign cannot be considered exclusive to submersion in water and can occur even earlier than previously described. Future studies should further investigate whether the tanatogenesis of the sign in decomposed cadavers follows different mechanisms compared to those submerged in water

## A SINGULAR ACCIDENT AT WORK: A CASE OF BURIAL ASPHYXIA

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**Introduction:** Deaths caused by asphyxiation constitute an important chapter of forensic pathology, being carried out as a consequence of accidental, suicidal, homicidal events and work accidents. An important variety, less studied than others, are deaths from blockage of chest expansion, which can occur by burial by sand, snow, building materials, as it occurs in case of natural disasters. The authors present a case of death from thoracic immobilization caused by the collapse of the attic of a building.

**Materials and methods:** A 31-year-old man died of injuries from collapsing floor and wall while using a jackhammer. He was found completely submerged in rubble. Lacerated and contused wounds to the head and hematomas to the back and lower limbs were found on the body. During the post-mortem examination, sandy material was found in the upper airways. Death occurred in a few minutes and the rescuers, despite the timely intervention, were only able to extract the body.

**Results and conclusions:** The histological findings confirmed the asphyxial nature of death by highlighting a picture of massive pulmonary edema, acute emphysema and polyvisceral congestion. As often happens in case of asphyxia, the hypoxia responsible for the death, in this case arising following the lack of excursion of the rib cage and diaphragm, was associated with another type of injurious determinism represented by the blunt trauma secondary to the collapse of the building structures.

## B&B THROATSLITTING: HOMICIDE, SUICIDE OR ACCIDENT?

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**Introduction:** We report the case of a 34 years old man, found dead in a B&B garden, with an upper-neck wound. The deceased checked in on the previous day with his fiancée, who was then found in their wildly damaged room, shocked, blood-soaked but physically unharmed and unable to explain what happened.

**Materials and methods:**
Investigations included scene inspection, autopsy, histological and toxicological exams, SEM-EDX (scansion electron, X-ray diffraction) microscopy and microanalysis.

**Results:** During inspection, glass broken objects and fragments, one of which (from a vase) blood-smeared, were found; blood traces started in the room, continuing toward the garden. At autopsy, neck examination showed a transversal incision in thyro-hyoid region, with anterior laryngeal discontinuation; wound extremities presented many superficial linear cuts. Cuts were also found in occipital region and on right hand palm. Vital blood vessels were intact. Histologically, bronchi and lungs showed extensive blood inhalation. SEM-EDX evaluation of wounds skin samples (neck, hand) found silicon particles – consistent with the glass components –, whereas toxicological analyses revealed cocaine and metabolites at toxic levels.

**Conclusions:** These findings led to conclude that the deceased, in a cocaine-induced psychosis, repeatedly cut his neck with a glass fragment, eventually producing a deep incision; the man survived long enough to move outside the room, reach the garden, suffer a head injury, eventually dying from internal submersion combined with hemorrhage. This case reminds that throat-slitting, often considered a homicidal occurrence, it's not uncommon in self-inflicted deaths, especially in case of drug abuse or psychotic conditions.

# ACCIDENTAL POISONING WITH COLCHICINE (*COLCHICUM AUTUMNALE*) WITH FATAL OUTCOME - CASE REPORT

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**Introduction:** Over the last five years, about thirty patients poisoned by plants with toxic alkaloids were reported to the National Poison Control Center, while about five cases had a fatal outcome. Colchicum autumnale poisonings are rare and accidental. They are caused by accidental replacement of edible ramsons *(Allium ursinum)* with the Colchicum autumnale, due to the physical similarities of these plants. Colchicine is the alkaloid that is responsible for the toxicity of Colchicum autumnale.

**Case presentation:** A 50-year-old patient, mountaineer, was admitted to Clinic for Clinical Toxicology of Military Medical Academy with information that he had consumed bear's garlic (ramsons). His symptoms included nausea, cramps, slow breathing, liver problems and dehydration. Due to the suspicion that there was a replacement of ramsons by autumn crocus, an HPLC-PDA analysis was performed for presence of colchicine, which was detected in urine sample. Fatal outcome occurred 24 hours after admission. Postmortem samples were extracted with chloroform with addition of ammonia. Analysis of samples was done by HPLC/PDA method, which was linear in range of 0.02-1.0 mg/L, with a detection limit of 0.01 mg/L. In the analyzed samples, colchicine was detected in following concentrations: urine 0.051 mg/L, blood 0.011 mg/L, kidney 0.008 mg/L and liver 0.007 mg/L.

**Conslusion:** Confirmation of the cause of death is not possible without toxicological-chemical analyses, and in assessing distribution of toxic agent, it is necessary to perform analyzes in parenchymal tissues. HPLC/PDA method is sensitive and reliable enough to detect colchicine and confirm poisoning with this compound.

**Key words: *Colchicum autumnale* poisoning, colhicin, HPLC/PDA**

# THE OLD DILEMMA: SUICIDAL MULTIPLE SHARP FORCE INJURIES SIMULATING HOMICIDE

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**Introduction:** The presence of numerous stab and incised wounds in different parts of the body casts suspicion of homicide, which after forensic analysis of the wounds and other marks on the body during the autopsy, leads to the exact determining of the manner of death.

**Materials and methods:** We present a case of a 45-year-old man, who worked as a butcher, found dead by his wife in the part of the yard of his family house with multiple stabs and incised wounds on the chest, neck, and left hand.

**Results:** The cause of the violent death was exsanguination caused by a massive hemorrhage from the injured heart within the wound channel. The autopsy revealed a wound on the left side of the chest with multiple tracks through the chest cavity and opening of the heart. Other wounds were superficial hesitation injuries and shallow tentative wounds of the neck that do not cause disability of making the final and fatal stub into the heart.

**Conclusion:** The differential diagnosis between suicidal or homicidal injuries is difficult in many cases. Therefore accurate and detailed analysis of all findings must be done, including the total number and anatomical site of injuries, clothing injuries, hesitation and defense injuries, the direction and depth of injuries, handedness, and localization of lesions.

**Keywords**: forensic, autopsy, suicide, homicide, stab wounds

# IMPORTANCE OF MEDICOLEGAL AUTOPSIES FOR DETERMINING THE MANNER AND CAUSE OF DEATH IN CHARRED BODIES

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**Introduction:** Death by burning can be associated with numerous mechanisms from isolated domestic accidents to concealed homicide action by disposing the body in a fire.
**Materials and methods:** We present a 49-year-old female burn victim admitted to the hospital. Immediately following admission, the fatal outcome occurs.
**Results:** In addition to fourth-degree burns, which were found primarily on the lower extremities and genital region, the autopsy revealed the unexpected presence of multiple stab wounds on the head, neck, chest, abdomen, and extremities, as well as incised wounds on the hands. The cause of the death was exsanguinations from stab wounds to the neck, thorax, and abdomen exacerbated by the effects of dry heat.
**Conclusion:** The manner of death is frequently challenging to determine for bodies recovered from the scene of a fire, mainly if there are injuries other than burns. In such situations, medicolegal autopsies of charred bodies are required to determine the exact manner and cause of death.
**Keywords:** medicolegal, autopsy, fire, homicide

# CHILD DEATH DUE TO SCALDING: ACCIDENT OR CHILD ABUSE?

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**Introduction:** Cases of domestic scalding in children raise suspicion of child abuse and remain a challenging problem in forensic medicine regarding the manner of death and high mortality in the pediatric population.

**Materials and methods:** We present a case of a 3-year-old boy found dead in his bed during the night after allegedly self-injuring in the bathtub earlier that day. The autopsy showed extensive scalds, including 90% of the body's surface. It was concluded that death was violently caused by severe shock due to second and third-degree scalds of the head, body, and upper and lower extremities.

**Results:** Scald pattern and severity of injuries demonstrated that accidental scalding by the child himself is intolerable under the circumstances described by the child's grandmother and mother.

**Conclusion:** Ruling out child abuse and homicide in child scalding represents a big challenge for forensic practice. Conclusions for every case should not be based only on autopsy findings and should include a multidisciplinary approach to this specific type of injury. In many cases, such as this one, it is difficult to determine whether the child's death was the result of a tragic accident caused by household members or the child alone, or the child was intentionally harmed.
Keywords: child, abuse, death, scalding

# THE ROLE OF ATHEROSCLEROSIS IN BLUNT FORCE INJURIES OF THE THORACIC AORTA.

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**Introduction:**The occurrence of traumatic aorta injury (TAI) depends on multiple internal and external factors. The goal of our research was to examine the effect of atherosclerosis - the most common disease affecting the aorta - on the vulnerability and tensile strength of the thoracic aorta.

**Materials and Methods:** One hundred four human aorta samples were examined from 52 pathological and forensic pathological autopsy cases. 2 dog-bone-shaped samples were removed from each body – one from the area between the intercostal arteries, and one from the left intercostal artery. The severity of atherosclerosis in the samples was evaluated both macroscopically and microscopically. The thickness of the arteries was measured by a motorized force tester (MecMesin MultiTest dV-AFG-500). Tensile tests were performed with a biaxial tester (Zwick/Roell zwickiLine Z5.0TN). The measured values during the tests were the maximal force (Fmax), the elongation at the time of Fmax (Emax), the force at the beginning of the rupture (Fbreak), and the elongation at the time of Fbreak (Ebreak).

**Results:**There was no significant difference between the sample groups A and B. The decrease of all measured values was shown by the increasing severity of atherosclerosis of the aorta samples.

**Conclusion:**The presence of atherosclerosis decreases the longitudinal resistance of the aorta. With the increasing severity of atherosclerosis, a smaller force is needed for the rupture, especially if severe (calcified) atherosclerosis is present. The results suggest that atherosclerosis should be considered upon forensic evaluation of TAI.

# UNCOMMON HOMICIDE CAUSED BY STABBING BLADE

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**Introduction:** The experience of the Institute of Forensic Medicine in Skopje has shown that the stabbing blade are commonly used in homicides, rather than in the cases of suicides. In this case study we would like to present a suicide with stab wounds in the chest area, caused by a knife.

**Materials and methods**: This study elaborates a case of a 55 year-old man, who has been found dead on the floor in the yard of the family house, with a knife in his chest. Four stab wounds have been detected in the man's body. The initial findings on the crime scene indicated a suicide. A forensic autopsy and criminalistic examination of the knife (DNA analysis of blood stains and epithelial cells found on the knife) have been conducted. A physical examination was performed on the sons and wife of the deceased.

**Results:** Some evidence indicated a suicide case: a suicide note, "tentative stab wound", the location and direction of the wounds, absence of defensive injuries. However, other evidence indicated a homicide: the place of the incident, double stab wound, damage to the bone tissue and mixed DNA profile on the knife handle.

**Conclusion:** In order to precisely determine the manner of death in stab wound cases, it is necessary to conduct a crime scene investigation, forensic autopsy and criminalistic examination of the object which has inflicted the injuries. The summary of the results led us to a conclusion that this is a homicide case.

# MANNER OF DEATH DETERMINATION IN A CASE OF GASTRIC MUCOSAL TEARS

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**Introduction:** We present a case of a 32-year-old drug addicted white woman found dead in a pool of blood in the house of her drug dealer, after she took a dose of intravenous heroin.

**Case description:** According to the drug dealer, the woman felt sick and vomited blood, fell to the floor and banged her head multiple times.

Since a laceration and some ecchymosis were found on the head, a murder was suspected and the man was arrested.

At autopsy multiple long superficial gastric tears, extending from the cardias to the gastric fundus were observed; one of them involved the subserous region, resulting in a gastric wall rupture. Moreover, no brain injuries were noted.

**Discussion;** This case has two interesting aspects:

On one hand, the manner of death was consistent with a natural death attributed to haemorrhagic shock as a consequence of acute gastric tears, and the drug dealer was cleared of murder charges.

On the other hand, gastric lesions are reported to stem from resuscitation and iatrogenic procedures (e.g. drowning victims), gastrolesive substances and infection, but no one of the condition was observed.

**Conclusions:** The aspect of the gastric tears observed at autopsy was different from that of injuries of Mallory Weiss syndrome, which are typically located at the esophagogastric junction, limited in number and rarely resulting in gastric perforations.

## THE PREVENTION OF ELDER MISTREATMENT: CAREGIVER'S ROLE

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**Introduction:** Elder Mistreatment (EM) is a growing public health problem, and in almost 60% of cases, the perpetrator is a family member. Current findings, according to their characteristics and their risks of perpetrating EM, identify "low-risk caregivers" and "high-risk caregivers". The authors present a case of physical elder abuse committed by a daughter suffering from depression treated with psychotropic drugs, where the psychiatric history of the perpetrator was the main risk factor for maltreatment.

**Case Report:** A 102-year-old woman, who lived with her daughter, was found lying on the floor next to her bed with numerous scratches, bruises, and nail marks on the face, extensive bruises and excoriations on the limbs. After two weeks of hospitalization, the woman died. The autopsy showed ribs and nasal bone fractures and subdural hemorrhages.The cause of death was brain dysfunction due to subdural hemorrhages.

**Discussion:** Physical abuse is one of the most common causes of EM, and psychiatric disorders are among the most frequent risk factors in both victims and caregivers. Thus, in the present case, the daughter represents a typical case of "high-risk caregiver", as she was suffering from poor controlled depression and had shown unusual behaviors in the previous days.

**Conclusions:** Early recognition and prevention of abuse by focusing on both patients and caregivers are needed. Therefore, the prevention of EM cannot ignore the identification of risk factors, such as high levels of stress and burden, social support, and psychiatric disorders, which put caregivers at high risk of committing EM.

## "OVERKILL" PHENOMENON IN CASES OF INTIMATE PARTNER HOMICIDES

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**Introduction:** Intimate partner homicides are the most extreme form of domestic violence, with women six times more likely to be victims of these murders than men. The term "overkill" refers to the infliction of injuries far more extensive than necessary to kill the victim and mainly occurs as a result of extreme anger of the perpetrator. Aim was to define the model of intimate partner homicides characterized as "overkill", as well as the profile and/or characteristics of the victim.

**Materials and methods:** Retrospective study of autopsy records included 33 cases of intimate partner homicides in which the overkill phenomenon was present. Standardized questionnaires that contained data about general demographic characteristics of the victims were analyzed. From the findings of the forensic autopsy we analyzed the type of weapons used and the type, number, localization and lethality of injuries.

**Results:** 81,8% of the victims were female. The scene of the murder was mostly the victim's apartment. More than three wounds were present in 57,6% of cases (highest number of wounds on the victim's body was 57). In 28,5% of cases, the perpetrator inflicted wounds on several body parts. The most commonly used weapon was firearm (61,5%), followed by the blade and blunt weapon. The most common motive was jealousy.

**Conclusions:** Homicides with an overkill phenomenon are relatively rare but represent significant public health and legal problem. It is necessary to implement the best possible prevention measures, which include prevention of domestic violence and adequate treatment of mental problems in potential perpetrators.

Keywords: overkill, intimate partner homicide, intimate femicide

# GUNSHOT RESIDUES AND FORENSIC TRACE EVIDENCE ANALYSIS AS SUPPLEMENTAL FORENSIC DIAGNOSTIC PROCEDURES IN DETERMINING THE MANNER OF DEATH – A CASE REPORT WITH LITERATURE REVIEW

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**Introduction:** Many delicate questions need to be answered during the autopsy of corpses with signs of violence, especially those related to firearm deaths. One of the most critical questions is determining whether the manner of death is homicidal, suicidal, or accidental.

**Materials and methods:** An autopsy of a male corpse with a suspected firearm head wound was conducted on the demand of investigative authorities. The rifle was found on the crime scene, far away from the body. External and internal autopsy findings revealed a severe head wound with massive destruction of the double chin, face soft tissues, and major blood vessels in an upward direction. The corpse's hands and head wound were subjected to a diphenylamine test to identify gunshot residues, and its garments were subjected to a stereoscope inspection and a diphenylamine test. Forensic trace evidence analysis (biological and blood pattern analysis) was performed on the rifle from the crime scene.

**Results:** Stereoscope and diphenylamine test analysis reported positive results on the pants, while the diphenylamine test was positive on the right hand. Forensic trace evidence analysis reported crucial findings regarding the rifle's position at the moment of firing and the mutual relationship between the muzzle and the entrance wound.

**Conclusion:** According to autopsy findings and all supplemental diagnostic forensic procedures, the manner of death was suicidal. Following a brief literature review, this case emphasizes the significance and importance of additional forensic diagnostic procedures in determining the manner of death.

**Keywords: forensic, autopsy, firearm, suicide**

# A WOMAN FOUND IN A BED STORAGE BOX: CONSIDERATIONS OF THE MANNER OF DEATH AND THE MECHANISM OF DYING

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**Introduction**: Unusual death scenes and obscure deaths often raise questions about the manner of death. The investigation relies on the autopsy findings to reveal if the death was the result of a criminal act.

**Case description**: We present a case of a 63-year-old woman with cerebral palsy who was found dead lying in a prone position in a bed storage box, last seen alive several days before. She had psychiatric diagnosis with no previous obvious suicide attempts. Doors were cluttered with furniture on the inside. Four months earlier she was found in the same bed storage box. The autopsy showed signs of psudomelanosis. Livores mortis were fully developed, but the neck region was more intensely coloured. There were skin abrasions on her knees and wrists. Hematomas of different ages were present in numerous body regions. The anterior mediastinum and the retropharyngeal space were impregnated with blood. Other macroscopical findings were unremarkable. Microscopical analyses did not give a definite conclusion about the cause of death. The toxicology report showed elevated levels of blood acetone.

**Conclusion**: Considering the mental status of the victim, her previous behaviour, the death scene, along with the autopsy findings we could presume that death was violent, most probably an accident. Postmortal changes affected the interpretation of findings, but different mechanisms of asphyxiation could be discussed (postural asphyxia, lack of oxygen in a confined space etc.). Also, in this case we cannot rule out possible electrolyte and acid base disorders due to starving and dehydration.

## “HOMICIDE, SUICIDE OR ACCIDENT?”

## COMPLEX DIFFERENTIAL DIAGNOSIS – A CASE SERIES

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**Introduction.** Differential diagnosis between homicidal, suicidal, and accidental death may be difficult, but a contribution to analysis of the phenomenon may be provided by case studies.

**Material and methods.** Comprehensive investigations, including forensic autopsy, toxicology, radiology and kinematic analyses were performed on three illustrative cases.
**Results.** In the first case a pedestrian was intentionally struck by a vehicle, and the perpetrator claimed it was an accident. Two days before, the victim had filed a report against the perpetrator for assault. The site investigation, autopsy, and kinematic analysis of the vehicle led to the identification of a homicide.
In the second case, a man was discovered deceased inside a car. A jackknife, an insulin pen, blister packs of benzodiazepines, and a suicide note were found. Upon further examination, it was determined that the insulin pen was sealed, and superficial cuts observed on the wrists as well as the exposure to benzodiazepines were unlikely to be the cause of death, which unexpectedly occurred due to fatal hyperthermia. The actual intention behind the incident, whether it was a genuine suicide attempt or a demonstrative act, is still a matter of debate.
In the third case, a man was discovered on the floor of an industrial establishment reporting fractures and head injury. Although a fatal assault was suspected, the autopsy report and forensic radiology examinations resulted in the diagnosis of accidental death.

**Conclusion.** These results confirm that the multidisciplinary approach plays a key role in the differential diagnosis of the manner of death.

# A COMPLEX CASE OF ATYPICAL HANGING IN COCAINE AND OPIATE EXPOSURE

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**Introduction:** Respiratory failure may be induced by many causes, either violent like hanging and drug overdose or natural as progressive diseases. In the presented case, many features undoubtedly identified an asphyxia death but of unclear manner and dynamics.

**Materials and methods:** A man with a story of psychiatric disease was found dead in an unusual position: the corpse lay on the knees, and the body weighed on the neck embedded between the bars of a small gate outside his apartment. During the autopsy, under a superficial cervical "sulcus", the dissection showed hemorrhagic infarction of soft tissues and fractures of bone/cartilage structures; histology revealed massive edema and multiorgan stasis. Blood samples tested positive for cocaine and opioids, exceeding the lethal dose.

**Results:** In the case presented, the cause of death could be identified as atypical hanging or drug-induced respiratory depression. Moreover, the manner of death could be stated as accidental or suicidal due to the patient's psychiatric history. The most likely solution was a comprehensive consideration of the evidence in the death process: drug intoxication may have caused the accidental fall, preventing the subject's capability to act and allowing hanging due to external neck compression performed by the gate.

**Conclusions:** Forensic pathologists may encounter several difficulties in defining the prevalent cause of respiratory failure and the manner of death, mainly in cases where a combination of causes can be identified. Studying the contribution of each potential cause in complex incidents can assist in reconstructing the most likely dynamics.

# TITLE: SUICIDE CASE MISTAKEN FOR HOMICIDE

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**Introduction:** According to worldwide statistic firearm is the second leading mechanism of injury related death. The case was reported by Trauma Hospital where a shot man was transported. The Police department reported that the man was found dead in his bathroom with a gun wound in the right side of thorax, caused by firearm, as homicide.

**Materials and method:** A full autopsy was performed revealing a contact shotgun wound with a 3 cm of diameter, free thoracic cavity, ruptured diaphragm in the right side, presence of blood in the volume of 1.5 liters. The liver presents a massive rupture of the lobes on the right side. The presence of a deformed plastic cork and spherical metal objects similar to shotgun pellets are found, a fracture of the 6th - 7th rib on the right side of the chest and the smell of alcohol. Blood from femoral vein and vitreous humour were sent to toxicological laboratory.

**Results:** The autopsy revealed contact gunshot wounds on the right side of the chest, rupture of the diaphragm and liver, fracture of ribs 6-7, accumulation of blood in the abdominal cavity, pellets and plastic cork. The toxicological analysis of blood and vitreous humor revealed BAC respectively 1.3 and 1.5 g/l.

**Conclusion :** The cause of death is traumatic hemorrhagic shock caused by contact gunshot right to left, up-down trajectory. The case was reported as homicide and the wife was accused of murdering her husband which she refused. A forensic investigation experiment was performed which revealed an atypical suicide case. The man being under pressure and the influence of alcohol, discussed with his wife regarding the paternity of the child and accused his wife of adultery. Due to his work place as security guard in an industrial facility, had been in possession of a short shotgun which he used to take his life.

# FORENSIC ANALYSIS OF FATALITIES IN A FIRE INCIDENT AT A MODULAR COVID-19 HOSPITAL: A CASE REPORT

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**Introduction**: This report analyzes the fourteen fatalities resulting from a fire incident at a modular COVID-19 hospital in Tetovo, Republic of North Macedonia, aiming to provide forensic insight into the accident. The official report determined that the fire outbreak originated from a defective extension cord connected to a defibrillator in use.

**Materials and methods**: Thirteen severely ill SARS-CoV-2-positive patients, six males and seven females aged 29 to 78 years, lost their lives in the fire, as well as a visitor who tried to assist her relative. The individuals were identified through comparative DNA analysis using samples from close relatives. Autopsies were meticulously conducted with compliance to personal protective equipment protocols. Carbon monoxide levels in peripheral blood were quantified using a spectrophotometric method, with levels of carboxyhemoglobin subsequently derived.

**Results**: Burn severity demonstrated a varied distribution, encompassing degrees ranging from first to fourth-degree burns. Soot presence in the trachea and bronchi of all victims provided evidence of smoke inhalation. False epidural hematomas were observed in 50% of cases. Carbon monoxide levels ranged from 0.14 to 6.31 vol%. Extensive burns were the primary cause of death in the majority of cases, while the visitor's death resulted from carbon monoxide poisoning.

**Conclusion**: The COVID-19 pandemic increased the demand for hospital beds, leading to the establishment of modular hospitals. However, regardless of the urgency, implementing enhanced safety measures within healthcare facilities remains of utmost importance, emphasizing the continuous need to improve healthcare systems' overall resilience and preparedness for future public health emergencies.

**Keywords: accident; COVID-19; fire-related deaths; carbon monoxide;**

# AUTOPSY FINDINGS IN FIRE-RELATED DEATHS: SUICIDE OR ACCIDENT? ANALYSIS OF NECROSCOPIC RECORDS IN FRIULI (1993-2022)

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**Introduction:** The determination of the cause and manner of death are critical issues in burned bodies, since in many cases important findings may be fashioned by the fire.
In this research autopsy findings in suicidal and accidental fire-related deaths were compared.

**Materials and methods:** records of autopsies held by the Institute of Forensic Medicine at the University of Udine were reviewed. Signs of vital exposure to the fire, total burn surface area (TBSA), burns distribution and non-fire related injuries were analyzed. Deaths as a result of explosions were included in the study.

**Results:** 33 cases of bodies of victims recovered from the fire were identified (age: 19-91 years; median=54 years): 25 accidents, 8 suicide (6 self-immolations and 2 complicated suicides). 5 victims were rescued before dying (4 accidents, 1 suicide).
The cause of death was attributed to fire-related injuries (16 accidents and all suicides), asphyxia, blunt trauma (4 accidents, each) and penetrating injuries (1 accident). TBSA resulted to be significantly higher in suicides (60-100%; average=93% vs 0-100%; average=57%; p=0.018, t-test), as well as the presence of the pugilistic attitude (5/8 suicides, 6/24 accidents; p=0.02, Fisher's exact test), and burns on the feet (10/25 accidents, all suicides, p<0.00, Fisher's exact test).
On the other hand, additional injuries were more frequently observed in accidents (14/25 vs 1/8, p=0.04, Fisher's exact test)

**Conclusions:** despite the imbalanced sample size of suicidal and accidental victims, a retrospective analysis of fire and non-fire related injuries has provided crucial elements in differentiating the manner of death.

# FROM SUICIDE TO ACCIDENT - CASE REPORT - THE SIGNIFICANCE OF THE MEDICO-LEGAL AUTOPSIES

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**Introduction:** Suicide is the intentional and voluntary act of destroying one's own life, while an accident is an unintended event that involuntarily causes injury to one's health or destruction of life.

**Case presentation:** We report a case of a 54-year-old male who was found in a forest in late November, approximately 500 meters away from his car. He was positioned bent over a trunk of a tree with his head beneath the rest of his body. His pants were down to his knees, and there were soiled blades of grass and leaves on his body. Investigation of the case circumstances revealed that he had attempted suicide by carbon monoxide poisoning, using a hose connected to the exhaust pipe and running it through the window into the cabin. Window on the driver's side was broken with glass particles on the driver's seat. Wrappers from "Rivotril" tablets, a generic benzodiazepine, were also found in the car.

Autopsy revealed the following: postmortem hypostasis was of a cherry red color and well pronounced on the upper part of the front of the body and face. Numerous bruises, contusions, and erosions were present all over the body. Frostbites were especially pronounced in the knees and elbows area. The synovial membranes were partially bloodstained and reddish in color. Opening the stomach revealed erosions of the gastric mucosa (Visnjevski sign).

Chemical toxicological analysis detected presence of benzodiazepines and carboxyhemoglobin (25%).

**Conclusion:** Based on the autopsy findings, chemical toxicological analyses, and investigation of the case circumstances, it was concluded that the death occurred due to the combined effects of hypothermia, postural asphyxia and carboxyhemoglobin and benzodiazepine intoxication. The manner of death in this case is a combination of accidental and suicidal, as the victim attempted suicide but ultimately died due to exposure to low external temperature.

# GENITAL MUTILATION AS A RESULT OF SHARP FORCE INJURIES AND DOMESTIC DOG PREDATION: ACCIDENT, ASSAULT OR SELF-INFLICTION?

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**Introduction:** Genital mutilations include a wide spectrum of lesions and require a careful investigation, since they can arise from accidents, assaults, cultural practices or can be self-inflicted.

**Case description:** In the present case, a 81-year old man affected by dementia, persecutory delusions and liver cirrhosis was found unconscious and half-naked in his courtyard without his genitalia and with a profuse bleeding in the perineal area. No signs of struggle or sharp tools were found on the scene. He was transferred to the hospital and underwent reconstructive surgery, but died 2 days later. Interestingly, the victim's dog, while being carried to a dog shelter, vomited part of his genitalia, as confirmed by the histological examination.
According to the surgical report the wound had sharp edges on its lower part and irregular and crenated edges with subcutaneous haemorrhage on the upper part.
At autopsy, linear scratches close to the edges of the surgical wound were noted, in absence of defence and tentative wounds, whereas toxicology was negative.
The cause of death was attributed to ischaemic encephalopathy caused by the profuse bleeding due to the genital mutilation.

**Conclusions:** The genital amputation was likely the result of a cut wound followed by an ante-mortem predation by the victim's dog.
The medical history of the man and the absence of defence lesions led to the hypothesis of a self-mutilation. However, since no weapon was recovered, the involvement of a third a party could not be ruled out and the manner of death remained undetermined.

## BOTH SIDE NECK INJURIES WITH A CHAINSAW: HOMICIDE OR SUICIDE?

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**Introduction:** The forensic literature comprises only a few case reports of chainsaw suicides. Reconstruction should be done by comparing wound morphology and the tool used to inflict an injury. The role of forensic autopsy in cases of "obviously chainsaw suicides" is essential and has to determine whether injuries found on the dead body could be self-inflicted.

**Case report:** A 39-year-old male was found dead in the meadow with his throat cut and a chainsaw beside him. The autopsy revealed that all injuries were confined to the head, neck and left shoulder. Two major (long and wide) wounds were found and documented on both sides of the neck and head. A wound on his neck on the postero-lateral side was noted.

**Results and conclusions:** As with most of the reported cases, the decedents had prior suicide attempts and a history of mental disorders. In the literature, most of the decedents generally have only one large wound, compared to our case where wounds on both neck sides were inflicted. The wound on the right side of the neck involved the back and side of the victim, but also the similar wound on the left side of the neck misled investigators. Because of the uniqueness of the circumstances, the forensic investigator initially had the impression that this case was a homicide. The final conclusion was ''suicide by chainsaw'' and it was explained by 12 main factors. In this unique case report, the major objective of the forensic pathologist was to determine whether all of the wounds could be self-inflicted.

# SECOND SHOT AIR RIFLE SUICIDE

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**Introduction**: Air-powered weapons are used worldwide for target shooting, sports and firearms training. They rely on the force of compressed air to propel the projectile, usually a lead or steel pellet. Air-powered weapons fire 4.5 mm (0.177) or 5.5 mm (.22) projectiles and can produce muzzle velocity of approximately 70-220 m/s. Deaths caused by air-weapons are usually classified as accidents and accomplishment in committing suicide with this kind of weapon is rarely seen.

**Presentation of case:** In this case we describe a 56 year old man who attempted suicide by firing air riffle pellet to his head. After the pellet got stuck between the bones of the skull and the soft tissues and skin of the forehead, he fired second time, to his chest. Although he was admitted to the hospital, he died soon after. The autopsy revealed that the pellet had passed through intercostal space, pericardial sac, right atrium of the heart and penetrated to the lower lobe of the right lung, where it was found, causing fatal bleeding (sudden loss of 2050 mL of blood). At the time of his death he was under the influence of alcohol. Suicide note was found at the scene.

**Conclusion:** This case is a contribution to the view that air weapons are not toys, but have real lethal potential. Therefore, we consider that the use of air weapons should be monitored in the same way as firearms.

# TWO CASES OF MULTIPLE STAB WOUNDS: SUICIDE OR HOMICIDE?

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**Introduction**. Multiple stab wounds in traumatic deaths usually indicate homicide. Nonetheless, a self-harming action should always be taken into consideration. Self-inflicted wounds tend to be in readily accessible regions of the body such as the anterior chest, neck and abdomen; sensitive areas are often spared. Hesitation wounds and no defence injuries are also typical of suicide.

**Materials and methods**. Two cases of atypical suicide with a knife are reported. Homicide was initially suspected due to the amount and distribution of the injuries but, after investigation, the involvement of any other person could be excluded. Each case was subjected to a full medicolegal investigation with an autopsy and toxicological analyses. Background information was also reviewed.

**Results**. *Case 1*: A 44-year-old male was found in an advanced stage of putrefaction on the floor of his flat. A lot of blood traces and a butterfly knife were found on the site. At autopsy, 14 stab wounds were identified to the anterior chest. *Case 2*: A 39-year-old male was found dead in his garage with a kitchen knife in his right hand. At autopsy, 25 stab wounds were identified to the neck and abdomen although only 14 were deeply penetrating. In both cases, there was a history of depression and there was no sign of forced entry or assault.

**Conclusions**. The integration of circumstantial data, scene and autopsy findings, in particular with the study of the site, shape and direction of wounds are required to avoid misinterpretation of the manner of death.

# HOMICIDE-SUICIDE IN SOUTHEAST SERBIA: A 15 - YEAR RETROSPECTIVE STUDY

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**Introduction:** Homicide-suicide is a variety of homicide in which the offender commits suicide after killing one or more people. The most frequent offender is of the male gender, about 40 years old, who commits suicide right after killing his spouse or intimate partner, primarily due to jealousy, estrangement, or separation.

**Materials and methods:** We carried out a retrospective analysis of all autopsies performed at the Institute of Forensic Medicine in Nis, Serbia (n = 12759) during 15 years (2008 - 2022), focusing on homicide-suicide cases.

**Results:** 54 homicide-suicide cases (0.42% of all forensic autopsies) were reviewed. For each case, additional analysis was conducted in order to determine the number of victims, mortality rates, perpetrator's and victim's age and gender, perpetrator's relationship to the victim, marital status, motivation and circumstances of fatal events, cause of death, injury type, injury pattern, and the method(s) used (firearm, sharp force, asphyxia, blunt force, intoxication).

**Conclusion:** Homicide and suicide are rare events that require in-depth investigation by the relevant authorities. Expertise in the medical-legal field is essential to the actions being implemented for this purpose. It is possible to incorrectly identify double or multiple homicides as homicide-suicide, as well as the natural death of one individual and the suicide of another, or simultaneous (tandem) suicides as homicide-suicide, which requires an extensive and multidisciplinary examination of each of these cases.

**Keywords: homicide, suicide, forensic, autopsy**