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BOOK OF ABSTRACTS

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INVITED LECTURERS
“PERSONAL INJURY ASSESSMENT IN CIVIL LAW: IS EUROPEAN HARMONIZATION POSSIBLE? “

Duarte Nuno Vieira

Harmonization of personal injury assessment in civil law has been an objective within the European Union since 1975. Multiple initiatives have been developed in this direction, but such harmonization remains only a dream and few concrete steps have been achieved. The European Confederation of Experts on Body Damage Assessment and Reparation (CEREDOC), proposed in 2000 a set of measures that could lead to this harmonization, if there is an effective political will to do so.

The author discusses the path that has been taken in the pursuit of this harmonization and presents a concrete proposal on the damage parameters to be assessed and on the need for a European disability table.

MEDICO-LEGAL GUIDELINES IN THE FIELD OF MALPRACTICE AND OF PERSONAL INJURY UNDER CIVIL-TORT LAW: AN OVERVIEW

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The preservation of uniqueness and the enhancement of the value of evidence in legal medicine is based on the implementation and development of a “quality management system,” which includes a continuous education of specialists, the introduction and application of guidelines and protocols, as well as mechanisms of internal quality control.

Starting from the process of harmonisation of the medico-legal autopsy rules in Europe in 1990, during the course of the years European and International medico-legal guidelines has been developed in the field of malpractice and of personal injury under civil-tort law.

In particular, in 2013, an International Working Group under the patronage of the European Academy of Legal Medicine developed the European Guidelines on medico-legal Methods of Ascertainment and Criteria of Evaluation in cases of suspected subjective "Medical Responsibility and/or Liability", which include a step-by-step illustrated explanation of approved Flow Charts, articulated in 18 sequential steps and comprehensive of both Methods of Ascertainment and Evaluation Criteria.

Furthermore, in 2016, an International Working Group composed of juridical and medico-legal experts published the International Guidelines on Medico-Legal Methods of Ascertainment and Criteria of Evaluation of Personal Injury and Damage under Civil-Tort Law, which includes a step-by-step illustrated explanation of flow charts articulated in eight sequential steps and a comprehensive description of the ascertainment methodology and the criteria of evaluation.

Finally, in the same year, a novel interdisciplinary methodology for the objective ascertainment of psychic and existential damage has been proposed by an International Working Group composed of psychologists and medico-legal experts, in order to ascertain impairments and/or disabilities which pertain to the "personal sphere" of the individual, such as pain and suffering, loss of amenity, and/or psycho-existential damage, which poses particular difficulties in relation to the obtainment of scientific evidence.
Expertise is a very important procedural action in all court proceedings, especially in criminal and civil proceedings. They are usually undertaken for the same purpose and under similar conditions, when it is necessary to provide the court with the assistance of experts, who, through their knowledge and expert authority, will enable the determination of certain facts which are not of a legal nature, but are important for clarifying the matter of the dispute.

In the continental legal system (including the Republic of Serbia), an expert who is processually disinterested in the outcome of the dispute, is involved in the proceedings. The expert is to notice the facts relevant to the procedure and then to give his or her expert opinion on the matter.

In Anglo-Saxon law the process function of the expert is the same, but the process status changes and approaches the position of the expert in continental law.

Whether undertaken in criminal or civil proceedings, expert witnesses are subject to the same procedural rules, which determine, on the one hand, the expert's procedural role, the conditions for determining the expert, his rights and duties, and, on the other, the procedural phase in which experts can be involved.

Of paramount importance in civil proceedings are the expertise of non-material damage caused by physical injury. The medical substrate of non-material damage consists of physical pain, fear, mental anguish (mental suffering), as incidental occurrences with injury or illness that lead to the right to compensation for non-material damage recognized in our law.

Medical expert evaluation is performed in litigation by examination of the injured party, examination of supporting medical records, based on information in court records, information learned from the injured party and others.

The subject matter of the expert evaluation is most often the existence, intensity and duration of the consequences that the injured party suffered as a result of the injury or illness. This presupposes a causal link between the injury and the adverse effects that are legally relevant.

Two of the most common medical issues for medico legal experts during civil proceedings in The Republic of Serbia are the causative expertise of whiplash injuries and the expertise of alleged dog bites.

**Keywords:** legal medicine, civil proceedings, expertise, whiplash injury, dog bites.
PRACTICAL PROBLEMS IN FORENSIC TOXICOLOGICAL DIAGNOSTICS - IMPORTANCE OF COOPERATION BETWEEN FORENSIC PATHOLOGIST AND TOXICOLOGIST

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Poisonings represent very important and common problem in forensic autopsy work. The frequency and structure of fatal intoxications have been variable in different societies and different historical periods. In common forensic practice the procedure of diagnostics of lethal poisoning and its manner is based on four main principles: case history, clinical manifestations, autopsy findings and toxicological analysis. It is very important for all forensic pathologists to thoroughly follow this procedure, since neglecting some of its parts can produce serious mistakes in final conclusion about the cause and manner of death. In this lecture typical cases from the autopsy material of the Institute of Forensic Medicine in Belgrade will be presented in order to illustrate the practical problems with which forensic pathologists are faced in cases when fatal intoxication is suspected. A special attention will be payed to the importance of cooperation between forensic pathologist and toxicologists for adequate interpretation of results of toxicological analyses.

DEVELOPMENTS OF FORENSIC MEDICINE IN FRANCE: CONNECTION WITH UNIVERSITY, TRAINING AND FINANCIAL ASPECTS

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During the 20th century, Forensic medicine in France mainly had a tradition of an academic discipline with few connections with hospitals and clinical practice. Forensic medicine developed in the 1980’s but the diversity of medical practice affected its recognition and development. A change was needed. Harmonization procedure includes the development of professional guidelines and allows forensic medicine and pathology to look at itself. However, the implementation of the recommendations is still far from complete. A national reform came into effect on 15 January 2011 and has defined a national reform of forensic medicine which includes funding by global budgets instead of fee-for-service. This reform allows easier organization and identification of 48 forensic medicine units and 30 medico-legal institutes over the country. Eight years later, tangible results are mixed. Forensic medicine is now more clearly identified but properly defined funding criteria are still lacking.
Forensic medicine and legal medicine are terms commonly used to describe all aspects of forensic work, rather than just forensic pathology, which is the branch of medicine that investigates death. Clinical forensic medicine (CFM) is the branch of forensic medicine that deals specifically with cases involving both legal and medical aspects of living persons. The practitioners of CFM medicine have been given many different names throughout the years, but the term forensic physician has become more widely accepted.

Even though a forensic pathologist generally does not deal with living individuals, and a forensic physician generally does not deal with the deceased, there are doctors who are involved in both the clinical and the pathological aspects of forensic medicine, which is the case in Serbia. CFM involves an interaction among medicine, law, judiciary, and police officials for the purpose of gathering material evidence of a criminal offense or adverse event. Typical roles of a clinical forensic physician implies determination, documentation and interpretation of bodily injuries, examination of: adult sexual assault victims and the alleged perpetrators, alleged child victims of neglect or physical or sexual abuse, torture victims and victims in alleged police assaults; determination of fitness to be detained in custody; assessment of alcohol and drug intoxication and withdrawal, person’s ability to drive a motor vehicle, and taking forensic samples - collection, and preservation of biological (blood, semen, urine, hairs, smears, etc.) and non-biological traces for toxicological, traceological, genetic (DNA) and the other analysis. Clinical forensic evaluation also includes accurately documentation of testimonial and injuries (including photography), interpretation of the findings, as well as written reports for appropriate civil, criminal, or other agencies and courts.

Over the past decades a significant progress has been made in the field of CFM. However, there is still a noticeable gap between CFM and law, because this forensic discipline represent relatively unexplored area for both, physicians and lawyers, which makes necessary for improvements of interdisciplinary coaction, and standardization of CFM standardizations and protocols.

THE ROLE OF FORENSIC MEDICINE IN MEETING THE REQUIREMENTS OF THE ISTANBUL CONVENTION

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The presentation provides a brief overview of the overarching principles and the main provisions of Council of Europe Convention on Preventing and Combating Violence against Women and Domestic Violence (the Istanbul Convention), primarily, in the areas of protection of victims and prosecution of perpetrators. It focuses on the role of forensic experts and other medical professionals in meeting the Convention’s requirements, and specifying their possible tasks, which might include: identifying and supporting victims, providing certificates of injuries and/or high-quality forensic reports (robust enough to be used in courts), in order to contribute to collecting evidence needed for prosecution and for ensuring convictions in cases of intimate-partner violence and sexual violence, participating in local multi-disciplinary teams aimed at ensuring multi-agency coordinated response to various forms of violence against women.
covered by the scope of the Convention, providing expert assistance in specialist services for victims (such as, sexual violence referral centres in hospitals), helping to ensure that re-traumatization of victims is prevented/minimized, and helping to identify cases of “disguised suicides” that occurred due to “honour-based” crimes.

The presentation further provides examples of promising practices, as well as gaps identified in policies of European countries - State Parties to the Convention, related to the role of forensic practitioners, relying on the analysis of reports of GREVIO (an independent expert body of Council of Europe that monitors the implementation of the Istanbul Convention). The analysis covers nine countries in which GREVIO has finalized its baseline evaluation of the implementation of the Convention.

**Keywords:** Istanbul Convention; domestic violence; sexual violence; forensic medicine
ORAL PRESENTATIONS
SESSION OS1:
PERSONAL INJURY CLAIMS ASSESSMENT
MOTORCYCLE HELMET: A LIFESAVER UNDER CONDITIONS

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Introduction: There is a strong research evidence that motorcycle helmets protect against injury and even death, although the lack of law enforcement, the educational and socioeconomic status usually lead people to avoid the helmet use.

Objectives: To present the frequency of motorcycle helmet use in different countries, and the conditions under which, it is a real lifesaver by reviewing the relevant bibliographic data.

Methods: A review of several studies evaluating the motorcycle helmet use, the effectiveness of different types of motorcycle helmets and effects of their improper use on head injuries, and the impact of a helmet law has been performed.

Results: According to recent data, in the USA it is estimated that the motorcycle helmet use, reduces the risk for fatal injuries (42%), and the risk for head injuries (69%).

More than one-third of motorcycle riders in some Asian countries wear the helmet improperly. Even in the same crash severity incidents, the helmet’s retention system and its proper fixation seem to be related to the injury seriousness.

Concerning Greece only 75% of riders and even less - 46% of passengers are wearing a helmet. Also, mortality rates from SVCs are the highest in EU.

The effectiveness of the helmet law implementation is reflected in the reduction in the number of deaths and in mortality ratios. Consequently, a better educational and socioeconomic status is directly associated with a decreased likelihood of injury.

Conclusions: The correct helmet use is crucial for the protection against head injuries. The law enforcement and the proper education of the public is of a major importance.

SHARP FORCE INJURIES ON BONES FROM ARCHEOLOGICAL SITE SKUPI AND BONES FOUND IN SO CALLED SKULL CAVE

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3. Archeological museum of Macedonia

During archaeological excavations at the south-eastern necropolis of the archaeological site Skupi in 2011 a part of an irregular semicircular trench has been discovered used as a mass burial tomb. The findings from the landfill that buried the burial trench indicate that the event probably occurred in the period of III or early IV century. Studies have shown that at least 200 men were buried in the mass grave, most of them between the ages of 20 and 40 with an average height of 170 cm. All skeletons were found to have antemortem, perimortem and postmortem
injuries. It should be noted that injuries that occurred before death were predominantly caused by the action of a blade and a tip of a weapon. What was particularly interesting during the analysis was the injuries to the neck vertebrae, lower jaw and the base of the skull, which together indicate decapitation. Injuries are most often localized in the fourth, fifth and sixth cervical vertebrae and lower jaw branches. Based on the available skeletal findings reliable decapitation has been established in 68 cases. In September 2016, a multidisciplinary team was involved in the expertise of bone material found in the Skull Cave located in the western part of the state near the Tajmiste mine. The anthropological findings from the cave belong to the so-called bone groupings (secondary burials). No skeletons found in the intact position. The minimum number of individuals determined by skulls is 61 and by bone material 70. Of these, 25% were children and the rest were adults of almost equal gender distribution. The average age is 36 years with an average height of 157-166 in adults. What is of forensic interest in this group of skeletons is the discovery of only one antemortem lesion that was healed and for the first time in the country a trepanation treatment has been found. The exact age of the bones cannot be ascertained but according to their appearance as well as the fact that some of the bones were incorporated into the cave walls, bones are probably more than 150 years old.

**Keywords:** forensic anthropology, sharp force injuries, decapitation, trepanation

### TODDLER'S DEATH DUE TO SHANGHAI FEVER-LIKE SYNDROME

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**Introduction:** Shanghai fever syndrome is presented as an enteric disease associated with fever, diarrhoea, and sepsis caused by *Pseudomonas aeruginosa*. Its adaptability and high intrinsic antibiotic resistance allow it to survive also in harsh natural and hospital settings. Cases of community-acquired *Pseudomonas aeruginosa* sepsis were subsequently reported in children without pre-existing conditions, primarily from Taiwan, Hong Kong, and China. The disease usually leads to serious complications and is associated with high mortality.

**Aim:** This paper aims at demonstration of a case of a 17-month-old male infant without significant history, in whom during a four-day hospitalization at the hospital peracute *Pseudomonas* sepsis with fatal consequences developed. On suspicion of neglecting health care, a complaint was filed to the Health Care Surveillance Authority (HCSA) and a criminal complaint to the police to investigate the accuracy of health care provision. An autopsy was ordered by police authorities.

**Methods:** The autopsy was performed with the complete macroscopic examination, photo documentation, and a wide range of additional laboratory tests. All the data from medical history and medical records were analysed, and an expert opinion was worked out. The case was reviewed by a consultant from the HCSA.

**Results:** The autopsy revealed massive cerebral oedema and congestion in the lungs, ecchymosis under serous membranes, swelling of soft tissues, effusion in the pleural and abdominal cavities, enlargement of the liver, spleen, and gall bladder, and foci of gangrene in the wall of the terminal ileum, caecum, large intestine and appendix, a severe stage of reduction of B-zone lymphoid tissue structures in the lymph nodes and bone marrow, and signs of massive reactive myeloproliferation with a predominance of activation of granulopoiesis with a massive
shift to the left. The culture examination revealed the massive presence of *Pseudomonas aeruginosa* in swabs from body cavities and more organs.

**Conclusion:** The immediate cause of death was a septic shock with a probably inapparent and not otherwise specified disorder of the child's immune system. Examination results confirmed the community origin of the infection. According to the literature, *Pseudomonas* bacteraemia and sepsis in hospitalized children is rare, while its mortality is high. It occurs mainly in children with a predisposition, but in one third of cases even in healthy children. According to the HCSA, the provision of health care in this case was assessed as incorrect. Based on the clinical course, laboratory and autopsy findings, the case was concluded as Shanghai fever-like syndrome.

**Keywords:** Shanghai fever; *Pseudomonas aeruginosa*; sepsis; immunity; autopsy

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**LEFT ARRHYTMOGENIC CARDIOMYOPATHY AND SUDDEN DEATH IN A JUVENILE ATHLETE: REVIEW OF THE LITERATURE AND CONSIDERATIONS ON A SINGLE CASE**

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Arrhythmogenic cardiomyopathy is a disorder characterized by fatty and fibrous replacement of the ventricular myocardium. Clinical manifestations consist of ventricular arrhythmias, syncope, progressive heart failure and occasional sudden deaths. We report the case of a 19-year old football player who collapsed immediately after beginning warming up exercise before a football training. ECG monitoring highlighted ventricular fibrillation and resuscitation attempts were unsuccessful. Past history was positive only for a hypertensive episode at age 13 and at the annual sport evaluation he was declared fit for sporting activity. Family history disclosed a myocardial infarction in a paternal uncle. Autopsy was performed according to guidelines for sudden deaths and it disclosed pulmonary oedems and congestion, a 425-gram heart weight and coronary arteries free from atherosclerotic disease. A 1 cm area of fibro-fatty subepicardial replacement was detected at the antero-lateral wall of the left ventricle and three foci of myocardial disarray surrounded by fibrosis were observed in the interventricular septum. No inflammatory infiltrate was noted and the right ventricle was unremarkable. Toxicology was negative, whereas genetic analysis was not available. The cause of the death was attributed to a fatal ventricular arrhythmia due to a left-dominant arrhythmogenic cardiomyopathy. Arrhythmogenic cardiomyopathy has been typically classified into a right ventricular (classical form) and biventricular pattern. The left-dominant phenotype represents the 5% of the overall cases and most of the literature consists of case reports. Main anatomical and clinical features of this disease are described in this communication, underlying that clinical manifestation display more often earlier than prominent morphological alterations.

**Keywords:** Sudden cardiac death; left-sided arrhythmogenic cardiomyopathy; ventricular dysplasia; ventricular arrhythmias
THE UNUSUAL CASE OF THE FATAL TRAPPING IN THE KING-SIZE LIFT-PLATFORM STORAGE BED

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Introduction: Compression of the entire thorax by a heavy object is the type of asphyxia with prominent cervicofacial cyanosis in combination with petechial bleeding, and subconjunctival hemorrhage: it is known as “crush asphyxia” or “traumatic asphyxia” – Perthes’ syndrome. There are cases of compression of the thorax in which the venous stasis is relatively mild without development of Perthes’ syndrome.

Case Outline: We are presenting the case of a 68-year-old woman, found in her home, trapped in the storage of the bed with a king-size lift-platform, in prone position. External examination revealed the counter-pressure skin abrasions and bruises, as well as hypostasis and pale areas, which corresponded with solid surface of the transoms of the lower part of the lift-platform and of the transoms of the bottom of the bed storage-box. Cervicofacial cyanosis, skin petechial bleeding, and subconjunctival hemorrhage were absent. The cause of death was crush asphyxia by chest and abdominal compression due to restriction of respiratory movements, facilitated by oxygen deficiency in the tidal air and atherosclerotic heart disease.

Conclusion: The unusual case where the person was accidentally trapped in a bed storage-box, presented in this paper, stresses the importance of close collaboration between medical and police forensic experts.

Keywords: Autopsy; Traumatic asphyxia; Thorax compression; Bed; Accident

SURGICAL AORTIC VALVE REPLACEMENT AND PARAVALVULAR REGURGITATION (PVR): A CASE REPORT

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Bicuspid aortic valve (BAV) is one of the most common congenital cardiac anomalies and several patients undergo aortic valve replacement (AVR). We report the case of a 25-year-old man who underwent elective surgical AVR due to severe aortic regurgitation and left ventricular dilatation related to BAV with raphe involving a porcine valvular prosthesis. Following trans-thoracic echocardiography (TTE) highlighted paravalvular leaks (PVL). A median sternotomy was performed to replace a new tissue valve, but TTE showed again PVR and bleeding of the aortic root. The prosthesis was removed and a re-replaced and sewing annulus was reinforced. However, a severe biventricular hypokinesia onset after the surgical procedure and both peripheral and central extracorporeal membrane oxygenation (ECMO) were unsuccessful, leading to acute ischemia of the right inferior limb and severe acute kidney failure. The patient underwent continuous veno-venous hemofiltration (CVVH) and he was candidate to heart transplantation but died the day after due to multi organ failure. Abundant loose tissue at the aortic annulus and at the aortic roof were described by the surgeons. Autopsy disclosed a 750-gram heavy heart, concentric hypertrophy and a massive acute biventricular myocardial infarction. Coronary arteries were free from atherosclerotic disease, although a
hypoplasia of the right coronary artery was noted. One leak was noted at the opening of the left coronary sinus and one leak was located between the openings of the two coronary sinuses. Ascending aorta was slightly dilated, and it was remarkably affected by tissue rarefaction and myxomatous degeneration. Tissue degeneration was observed at both mitral and aortic annuli. Toxicology was negative.

PVR is a serious but rare complication of valve replacement surgery, involving more frequently biological prostheses. However, studies have shown that it affects more mitral prostheses and it occurs more frequently after trans catheter AVR.

**Keywords:** Aortic valve replacement; bicuspid aortic valve; myxomatous degeneration; paravalvular leak; paravalvular regurgitation

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**UNUSUAL GUNSHOT DEATH AND CONTRIBUTION OF BLOODSTAIN PATTERN ANALYSIS IN DETERMINATION OF MANNER OF DEATH – A CASE REPORT**

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Bloodstain Pattern Analysis (BPA) represents the examination of the shapes, sizes, locations and distribution of bloodstains in order to provide an interpretation of the events that caused their uprise. The purpose of BPA is to draw conclusions about the nature, timing and other details of the crime. When it comes to firearm fatalities, the main goal of forensic analysis is to distinguish firearm suicides from homicides and accidents. We present a case of a 48–year man who was found in his camper with a gunshot wound on the chest. At first glance, it looked like a homicide, because of the fact that the bullet was not found, because of unusual position of death body and unusual distribution and amount of bloodstains. The autopsy revealed the entrance wound on the front and the exit wound on the back side of the chest, with heart injury. BPA in synergy with autopsy report revealed that gunshot took place in camper while a deceased was on a back seat of his vehicle in sitting position. Both front and back slide doors were closed at time of shoting and subsequent bleeding, and there was no void in bloodstains to indicate presence of second person. Finally, it was concluded that the manner of death of the deceased was suicide. According to obtained results from expertise re-examination of the vehicle resulted in finding a bullet in a back window rubber seal.

**Keywords:** Bloodstain Pattern Analysis; gunshot; suicide;
SESSION OS2:
FREE TOPICS
Cryptococcosis is an infectious disease caused by the fungus Cryptococcus neoformans, which is usually found in soil contaminated by bird feces. Cryptococcal infection is usually acquired from the environment through the inhalation of contaminated particles into the lungs, which is followed by meningeal and cerebral involvement via a hematogeneous route. Cryptococcosis often affects the immunocompromised, but it also occurs in immunocompetent individuals. The aim of the study is to present a rare case of Cryptococcosis cause of death, which was determined with the aid of only histological investigation using hematoxylin and eosin staining. A 27-year-old, previously healthy male, was hospitalized to the medical ward with a 2-week history of seizures, ear infection and fever. During the hospital stay he had headaches, loss of appetite, difficulties walking and altered level of consciousness. The patient died after 19 days of hospitalization without a definite diagnosis. The gross examination of the autopsy determined brain edema, bronchopneumonia and edema signs on the cut surfaces of the lungs. Histologically, the brain parenchyma contained Cryptococcus infection which was surrounded by inflammatory cells. Also, the intraalveolar spaces of the lungs were filled with Cryptococcus neoformans, which were also present in sections from the liver. These histological findings were determined using H&E staining and confirmed with PAS and Grocott stains.

**Keywords:** Cryptococcus neoformans, brain, lung, histopathology

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**AGE ESTIMATION IN CHILDREN BASED ON OPEN APICES MEASUREMENT IN SERBIAN POPULATION: BELGRADE AGE FORMULA (BAF)**

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Aim was to establish a new, simplified formula for age assessment by measurement of open apices of mandibular permanent teeth. Panoramic radiographs of 442 healthy Serbian children aged 5 - 15 years were gathered and analyzed by two independent researchers. The new formula - Belgrade Age Formula (BAF) was developed and tested on Serbian sample. Furthermore, BAF was tested on Italian sample of 2125 children aged 5 - 15 years. In Serbian sample, the residuals of BAF were -0.0001 ± 0.8381 and 0.0055 ± 0.8851 for females and males. In Italian sample, mean difference between estimated and real for BAF were 0.182 ± 0.951 and -0.195 ± 0.923 for females and males respectively. BAF could be reliable formula for age estimation in other population than Serbian.

**Keywords:** forensic science, age estimation, dental maturation, open apices, forensic anthropology
APPLICABILITY OF PULP/TOOTH RATIO METHOD FOR AGE ESTIMATION ON A REAL FORENSIC CASE

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The purpose of this study was to evaluate the reliability of tooth/pulp ratio method in process of age estimation in the moment of death in a forensic context and compare it with standard anthropological methods.

Mass graves were found and exhumated in Batajnica sites, Serbia in 2002 and 2003. Skeletal material was carefully analyzed by anthropologists and pathologists. As a part of the investigation, orthopantomography (OPG) was performed for each individual. During 2018, for scientific purposes, these OPGs were reexamined. Age-at-death was assessed by means of pulp/tooth method applied on all available lower premolars. Estimated age following standard anthropological methods and chronological age (obtained after DNA identification of victims) was taken from the records. Age estimation of pulp/tooth method and standard methods was compared with chronological age.

Pulp/tooth method was accurate in 81.25% and standard method 56.25% of all cases.

The pulp/tooth method was found to be applicable and accurate. However, age estimation should be based on all available methods

Keywords: Age estimation, Forensic Anthropology, Mass grave, adults

DENTAL AND SKELETAL AGE ESTIMATION IN CHILDREN WITH CEREBRAL PALSY

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Aim: The objective of this study was to determine correlation between dental, skeletal and chronological age in children with cerebral palsy.

Materials and methods: The study sample was consisted of 53 panoramic radiographs and left hand-wrist bones radiographs of children with cerebral palsy aged between 7 and 15 years. Panoramic radiographs of 106 healthy children with same age was set as control group. In order to estimate the level of dental maturity, two methods were used: Willems’ method and European formula. Skeletal maturity was assessed by measuring the area of carpal bones and epiphyses of the ulna and radius (Bo) and carpal area (Ca).

Results: In group with cerebral palsy, one-sample t-test showed that the mean residuals (the difference between estimated and chronological age for each individual) in females were -0.825 ± 1.319 (p=0.003) and in males 0.703 ± 0.877 (p=0.001) when European formula was applied. The mean residuals in females were 0.102 ± 1.152 (p=0.642) and in males 0.036 ± 1.072 (p=0.871) if Willems’ method is used. Estimated skeletal and chronological age showed mean
difference 0.017 ± 1.662 (p=0.965) and -0.338 ± 1.762 (p=0.455) for females and males respectively. In group with healthy children, residuals of the European formula in females were -0.353 ± 0.855 (p=0.006) and males 0.500 ± 0.803 (p=0.001). Residual of Willems’ method for females were 0.266 ± 1.151 (p=0.116) and for males 0.130 ± 0.986 (p=0.325).

**Conclusion:** There is no significant differences in dental development between children with cerebral palsy and healthy children. It was not detected significant delayed skeletal development in children with cerebral palsy.

**Keywords:** forensic anthropology, age estimation, dental age, skeletal age, cerebral palsy
BLOODSTAIN AGE DETERMINATION WITH FOURIER TRANSFORM INFRARED SPECTROSCOPY: CRIME SCENE MODELLING

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Bloodstain age determination is one of the important issues to be used as an additional data for both the time of the crime and the limitation of the postmortem interval during the reconstruction of a crime scene. Although there are certain studies in the literature involving different methods, Fourier Transform Infrared Spectroscopy (FTIR) has been utilized among novel methods in recent years.

A detailed review of related literature reveals possibility of determination of bloodstain age by obtaining FTIR spectra of bloodstains on standard materials. However, the reliability and validity of the method at an actual crime scene is still unknown. In this study, bloodstains on glass, wood, ceramic, plastic, metal and leather surfaces, which are likely to occur on the bloodstain at the crime scene, were kept for an interval ranging between 0 hours to 2 months under normal room conditions. FTIR spectra were obtained at different time periods, and both spectral changes with time and differences between these change patterns between surfaces were examined.

As results of the present study, effects of time on many different adsorbent bands were observed in accordance with the literature. Different spectral results obtained especially on the leather surface as an organic material. In the leather samples; band areas at 2920-2940, 1530-1550 and 1170-1190 cm⁻¹ have not shown any time-dependent changes as in the other samples. Furthermore, the changes occurred at 1630-1640, 1230-1250 and 1070-1090 cm⁻¹ occurred in the opposite direction of other samples. Evaluation of bloodstains on metal surface revealed that all spectral changes occurred faster than other surfaces. The spectral changes were the slowest in the samples on plastic and wooden surfaces.

The properties of the surface on which the bloodstain is deposited need to be taken into consideration to achieve more accurate bloodstain age with FTIR. In the literature, it is seen that ignoring surface properties in publications investigating the determination of bloodstain age with FTIR is one of the biggest obstacles to utilize the method in the field. To the best of our knowledge, this is the first study in the literature which examines changes in the FTIR spectra of bloodstain on different surfaces. The results of the present study showed that the changes in FTIR spectra of blood stain can be intensely affected by the surface properties, especially in organic materials such as leather, while the spectral time-dependent changes can be faster on conductive surfaces as happened in metal surfaces, and slower on non-conductive surfaces as happened in plastic and wooden surfaces.

Keywords: FTIR; bloodstain age determination, crime scene investigation
IS IT POSSIBLE TO USE WOUND DIAMETERS AND GSR SCATTERING AREA TO DETERMINE FIREARM CALIBER AND/OR SHOOTING RANGE IN CLOSE RANGE GUNSHOT WOUNDS?

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Firearm-related injuries are one of leading causes of morbidity and mortality in the world. For the purpose of assessing the shooting distance, most of the forensic literature describes only visual/microscopic methods for examination of the appearance of the wound and discharge particle patterns around. In earlier ages researchers tried to prove potential usage of wound size, it surface area, but results were very inconclusive. Wound diameters and only visual analysis of dispersion of gunshot residues (GSR) are used in practice, like some kind of screening method, just to check does it fit to the known story from crime scene, etc. fire range. Gunshot residues on the skin (GSR) of a victim are important evidence, with far more better precision, for reconstructive questions in the forensic investigation of cases involving gunshot wounds. Aim of this experimental study was to analyze is there any significant difference in macroscopic characteristics of wounds that were caused with different types of weapons from three different distances.

Study is conducted in Department of Ballistic and Mechanoscopic Expertise, Center for Forensic and Information Support, Federal Police Directorate. Experiments were done on pigskin and 55 samples were made. Part of the pig body size is approximately 120 x 45 x 20 m composed of skin, subcutaneous and muscle tissue, areas of the chest and abdomen, which is attached to a solid surface. Shooting was conducted using a system for safe firing from the firearm (Verifire-The Secure Firing Device, Twin Tooling, Canada). Samples of the pigskin were shot by firing projectiles from four different weapons and from three different distances, (contact wound, and near contact wound, 5 cm and 10 cm).

At the contact range; wounds caused with automatic rifle had horizontal, vertical diameters significantly larger than those made by pistols. Diameters on the gunshot wounds that were caused with different pistols, were very similar and none of them was statistically different. Pistol with 7,65 mm caliber had smallest GSR scattering area, while wounds from automatic rifle had biggest GSR scattering area, but size was very inconsistent. At the range of 5 cm narrowest part of contusion ring had differences even on pistol wounds, but there wasn’t any significant difference in the diameters of the wound, or even in wound surface. Also diameters at the range of 10 cm are in favor of these results. Gunpowder residues scattering area was statistically different depending of type of weapon (p=0,004). Interesting is that there was no statistically significant difference between GSR surface area around wounds that were caused with pistols. Small number of papers was done on this topic.

Based on this small sample, vertical and horizontal diameters, also wound surface area are useful for differentiation between pistol and rifle caused wounds from contact and near close range. It is unsecure method for determination of pistol caliber or fire range. Gunshot residues have much greater potential for future analyses, but even GSR can’t be used to determinate pistol caliber. It can be used to determinate rifle inflected wounds. GSR scattering area can be used to determinate range.
**Introduction:** A forensic pathologist and a bloodstain pattern analyst are differently educated experts, but they are both involved in determining the manner and the mechanism of death. There are a few medical forensic experts that simultaneously educated in those disciplines. Our work presents the benefits of a holistic approach to forensic expertise.

**Material and methods:** Material was obtained from expertise reports of the Institute of forensic medicine in Nis. We have simultaneously analyzed three autopsy cases and bloodstain pattern analysis (BPA) reports which individually couldn’t explain all important circumstances of the death.

**Results and discussion:** The first case was the homicide of a 73-year-old man, for which investigating authorities had believed it was an accidental death. Although autopsy unequivocally revealed violent death, the manner of death was inconclusive. Subsequent BPA at the crime scene revealed the position of a deceased at a time of sustaining injuries, which was inconsistent with the previous assumption of accidental death. Combination of obtained facts from both reports was terminated by arresting of two offenders. The second case was the homicide of a 48-year-old woman in her bedroom. At first glance, it looked like a robbery, because of the fact that her husband also sustained head injuries in occipital region, but most of items in house were overturned. The autopsy revealed severe blunt force trauma of the head and BPA revealed the position of the victim and the assailant. Both expertise revealed the mechanism of sustained injures that was pointed out on high emotional discharge of assailant. Finally, husband of deceased woman was arrested and he pleads guilty. The third case was the homicide of an 82-years-old woman with shotgun pellets. The autopsy revealed a massive gunshot wound of the left forearm and a lot of single wounds on the front side of the chest and abdomen. It seemed to be two shots, one from close range in the forearm and the other from distance in the chest and abdomen. BPA analysis showed that was a single shot from a close range, with a secondary scattering of pellets at the broken forearm bone fragments.

**Conclusion:** Bloodstain pattern analysis in Serbia is relatively new forensic discipline. Crime Scene Evidence Technicians in Serbia are familiar with BPA, but according to our legislation, they are not allowed to perform subsequent expertise on bloodstains found at a crime scene. Benefits of synergistic forensic medical and BPA expertise is more than evident in presented cases. Therefore, education of forensic pathologists in the field of BPA should be useful for solving suspicious and indistinctive cases.

**Keywords:** forensic medicine; autopsy; bloodstain; bloodstain pattern analysis;
The purpose of War crime investigation would be to address the two main issues: to determine the circumstances in which death occurred, as well as the actual cause of death, and to identify the deceased persons. To successfully complete investigation Forensic pathologist is often faced with number of limitations: lack of soft tissues on bodies, variable burial conditions and variable decomposition of the remains, “grave robbing” and transfer of the remains, variable exhumation process, postmortem injuries, possibility of a "cover-up" with injuries being modified or tampered with to hide the truth. We present you our experience of Bosnia War crime investigations, and how to recognize evidences and overcome limitations.

Keywords: War crimes, Evidence, Limitations, Forensic medicine
SESSION OS3:
FORENSIC TOXICOLOGY
DRIVING UNDER THE INFLUENCE OF DRUGS – EXPERIENCE FROM THE DEPARTMENT OF FORENSIC MEDICINE, UNIVERSITY OF PÉCS

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The driving under the influence of drug (DUI) cases from the Department of Forensic Medicine, University of Pécs were analysed. The average time between the act and the sampling was 136 minutes (min: 38; max: 700). The most commonly found illegal substances were cannabis (38%), amphetamines (37 %) and new psychoactive substances (21 %). Alprazolam (52 %) and clonazepam (24%) were the most commonly found medicines. Cannabis was used alone in 72 % percent of the cases, while the amphetamines and new psychoactive substances were usually used in combinations with other type of drugs (89 % and 64 %), the former mostly with cannabis (31 %). Substances from three different groups was found in 6%, and substances from four different groups was found in 4 % of the drivers.

We analysed the symptoms recorded in the documentations at the time the blood and urine samples were taken. The recorded symptoms seems to have no good correlation with the blood concentration of the substances in case of cannabis and amphetamines. Our data suggests, that in case of cannabis, the only possible indicator is the weaker pupil reactions, while the nystagm, the altered speaking and behaviour are the possible indicators in case of amphetamines. In case of the use of new psychoactive materials, the recorded symptoms seems to be more reliable and useful than in the case of the classical recreational drugs. The unreliability of recorded symptoms present large difficulty in evaluation of DUI cases.

Keywords: DUI, cannabis, amphetamine, new psychactive substances, symptoms

FORENSIC ASPECTS OF CARBOXYHEMOGLOBIN CONCENTRATION – AUTOPSY STUDY

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Introduction: Carbon monoxide (CO) is produced by incomplete combustion of organic compounds; common sources include fire, engine exhaust, and faulty furnaces. The saturation of hemoglobin with CO varies greatly from one fatal case to another and carboxyhemoglobin (HbCO) concentration above 10% is usually considered as vital reaction in exposed victims.

Aim: To analyze forensic aspects of exposure to CO in Belgrade region.

Materials and methods: A retrospective autopsy study was performed, covering a 6-year period (2013–2018) and it included all the cases where postmortem blood analysis showed positive values of HbCO and the circumstances of the case and/or autopsy findings indicated exposure to CO. We excluded cases where fatality happened outdoors or there was an outliving period. Wolf’s method was used for the measuring of HbCO concentration. Study sample was analyzed with regard to gender, age, presence of vital reactions (soot aspiration and HbCO concentration above 10%), cause and manner of death, degree of burns, heart weight, degree of atherosclerosis, smoking status and alcohol consumption (acute or chronic).
Results: The study sample comprised of 54 men (54±23 years old) and 14 women (65±33 years old) \((\chi^2=23.529, p<0.05; t=-1.518, p>0.05)\). The average HbCO concentration was 37±31\% (median 25.50\%, range 2–80\%). Soot aspiration was present in 71\% (N=48), HbCO concentration was above 10\% in 66\% of cases (N=45), but combined, these signs were present only in half of all cases (N=35; 52\%; \(\chi^2=0.059; p>0.05\)). Among inebriated (32\%), average blood alcohol concentration was 1.6±1.2 \(\%\) (range 0.05–3.65 \(\%\)). The most common cause of death was accidental CO poisoning (N=27; 40\%; \(\chi^2=102.209; p<0.05\)). Median HbCO concentration statistically significantly differed in relation to the cause and manner of death (\(\chi^2=37.078\) and 11,940; \(p<0.05\)), but it did not differ in relation to the presence of soot aspiration, degree of burns, smoking status and alcohol consumption, either acute (at the time of death) or chronic. The results showed a negative correlation between the HbCO concentration and heart weight (Spearman’ Rho -0.278; \(p<0.05\)), while the correlation between the HbCO concentration and degree of atherosclerosis was not statistically significant.

Conclusion: Men are most commonly exposed to carbon monoxide, dying accidentally from poisoning. In only half of the victims exposed to CO, the autopsy would reveal soot aspiration combined with HbCO concentration above 10\%. The presence of cardiomegaly is correlated with lower fatal concentrations of HbCO.

Keywords: Autopsy; Carbon monoxide; Carboxyhemoglobin; Poisoning; Toxicology

WOMEN, ALCOHOL ABUSE AND SUICIDE – AUTOPSY STUDY

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Introduction: Women have lower rates of alcohol and substance abuse than men, which were considered as protective factors against completed suicide. However, it’s becoming obvious that alcohol use among women has been increasing with economic development and changing gender roles.

Aim: To analyze alcohol use among women who committed suicide in Belgrade region.

Materials and methods: A retrospective autopsy study was performed, covering an 11-year period (2007–2017) and it included all cases of suicide. Study sample was analyzed with regard to gender and blood alcohol concentration (BAC), as well as age, suicide method, previous suicide attempts, existence of psychiatric disorders, family history of suicide and marital status.

Results: Out of 1482 suicide cases, 346 (23\%) were women. Among them, only 34 (10\%) have used alcohol prior suicide, which was less common than in men (\(\chi^2=21.218; p<0.05\)). In average, they were 49±17 years old (range 22–86) and had BAC of 1.29±1.25 \(\%\) (range 0.07–5.12 \(\%\)). Both of these variables didn’t differ compared to males (Mann-Whitney U= 3787,500 and 3715, 500; \(p>0.05\)). Younger women were more commonly inebriated (Spearman’ Rho -0.138; \(p>0.05\)). As man, drunken women most commonly used hanging as a suicide method (N=19; 56\%), but the second method of choice differed – in women it was jumping from height (N=7; 21\%), in men gunshot wound to the head (\(\chi^2=24.312; p<0.05\)). Half of inebriated women had at least one previous suicide attempt (N=16; 47\%; \(\chi^2=0.032; p>0.05\)), but more commonly they haven’t been treated for psychiatric disorders (N=21; 62\%; \(\chi^2=2.455; p>0.05\)). These women were most commonly single (N=9; 27\%; \(\chi^2=4.562; p>0.05\)) and didn’t have suicide history in the family (N=19; 56\%; \(\chi^2=11.636; p<0.05\)).
Conclusion: Even though women drink less commonly prior suicide, the ones who drink do it in the same amount as man. Among woman, age seems to be protective factor against drinking prior suicide. Hanging remains the preferred suicide method among inebriated subjects, regardless of gender.

Keywords: Autopsy; Suicide; Alcohol; Women

AMPHETAMINE POISONING OF A 5-MONTH OLD INFANT – A CASE REPORT

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A healthy, well-cared 5-month-old female infant died by acute amphetamine poisoning. Autopsy was ordered for suspected sudden death. The autopsy and toxicology findings revealed that it was a forensic case. The baby died in a hotel room while she was sleeping on a double bed among the adults. Ambulance found manifested post-mortem changes and the cardiopulmonary resuscitation was unsuccessful. The mother and her partner had a history of drug abuse.

The autopsy findings were marked reddish hypostasis, petechial (skin, pericardium, pleura, thymus, scalp), cerebral and pulmonary oedema, severe congestion of the arachnoid membrane, shock kidney, and empty stomach. Superficial scratches/abrasion were visible on her nose, lower lip and chin. Histologically generalized cytomegalovirus (CMV) infection, acute emphysema, and haemorrhage around the small intracerebral vessels were proved. By toxicological analysis 22.5 ng/ml amphetamine was detected in the blood.

No information is available in the literature about the toxic or lethal blood levels of amphetamine at 5 months age. The cause of death most probably was amphetamine poisoning as no natural disease could be proved. The criminal process is still ongoing, and the way how amphetamine is entered the infant's body is still not proved. Amphetamine couldn’t get into her body by breast feeding as she received only special formula milk for gastroesophageal reflux.

In the international literature we couldn’t find fatal amphetamine intoxication in so young age, like this.

Key words: amphetamine poisoning, infant’s amphetamine syndrome, drug abuse, unnatural death of infants
THE IMPORTANCE OF FORENSIC TOXICOLOGY ANALYSES IN DETERMINATION OF UNKNOWN CAUSE OF DEATH

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Alcohol can cause or be involved in deaths in various ways, both through direct, acute alcohol intoxication or indirect (accidents and crimes) impact. Consumption of abundant amount of alcoholic beverages over a short period can cause a severe clinical condition known as acute alcohol intoxication. Alcohol levels can be measured in the blood as a preferred tissue, urine, vitreous humor or even the brain, spleen or striated muscle tissue.

Case history. A 62-year-old male was admitted in the emergency department in a comatose condition, without information about his previous medical condition or the data about circumstances prior to admission. Despite the urgent medical measures, death occurred after one hour. Due to unknown cause of death, a medico-legal autopsy was requested and performed the following day. At the autopsy, the external examination did not show the presence of injuries except injection wound on the dorsal side of the hands. The internal examination has shown severe brain and pulmonary edema. The other internal organs showed no significant pathological findings. The tissue specimens of parenchyma organs were sampled for routine histological and toxicology analysis, as well as gastric content, femoral blood, vitreous humor and urine samples for toxicology analysis. Pathohistology examination confirmed the brain and lung edema. Toxicology analysis of blood, urine and vitreous humor was performed by headspace gas chromatography with a flame ionization detector (HS-GC-FID). Determined ethanol concentration in the blood was 4.74 mg/ml, urine 5.10 mg/mL, and vitreous humor 5.02 mg/mL. A complete toxicology analysis revealed no evidence of any toxic substances or drugs. Based on ante mortem data, autopsy findings and primarily toxicology results of the lethal blood alcohol concentration, in the absence of the other possible causes of death, it was concluded that the death was violent and occurred as a result of acute alcohol poisoning.

The blood alcohol concentration of 4 mg/mL is considered to be even more lethal, but there are individual variations with respect to sex, age, body weight, chronic alcohol abuse, etc. It is well known that blood alcohol concentrations above 4 mg/mL often resulted in a lethal outcome as a consequence of central respiratory depression. As shown, the results of forensic toxicology analysis have a very important role in the determination of the cause of death, especially in cases of unknown death or without specific external and internal autopsy findings.

Keywords: forensic, alcohol, poisoning, HS-GC-FID
SESSION OS4: CLINICAL FORENSIC MEDICINE & FREE TOPICS
UNUSUAL CHARACTERISTICS OF GUNSHOT WOUNDS IN CLINICAL FORENSIC PRACTICE

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Gunshot wounds are common in forensic practice. Usually with their characteristics its easy to determine the entrance and exit wound. Nevertheless, in some cases in the clinical practice gunshot wounds can be misdiagnosed by the clinicians especially when non standard ammunition is used, in cases of shooting from long distance and shooting trough a solid material. This can cause morphological changes on the entrance wound which are not specific for gunshot wound and can mislead the clinicians into proceeding with a wrong treatment of the patient which in some cases can be lethal. In this report we will present 3 cases of misdiagnose and treatment of the patients in clinical practice, after which gunshot wounds were determinate in clinical forensic practice.

Keywords: gunshot wounds; clinical forensic medicine; misdiagnose

FORENSIC INVESTIGATION OF INTERPERSONAL VIOLENT INCIDENTS IN GREECE

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Introduction: Interpersonal violent acts are considered a global public health problem. Victimization of adult women by an intimate partner (IPV), child abuse, and sexual assaults are known to be reported rarely to the Authorities, and less frequently than other forms of interpersonal violence (e.g. community violence, youth violence). In many countries, as in Greece, a Forensic Pathologist is required to examine victims that have made an allegation about the violent incidents, not only for injury assessment, but furthermore for other judicial purposes (e.g. severity of injuries, incapacity time).

Materials and Methods: For this retrospective study, we used the archives of forensic clinical examinations that were conducted during 2012-2016 at the Department of Forensic Medicine and Toxicology of National and Kapodistrian University of Athens. Anatomical distribution of injuries, demographic characteristics of victims and perpetrators, and other variables of the alleged incidents were collected anonymously for every case of alleged interpersonal violence.

Results: A total of 2,466 forensic clinical examinations were performed at our Department during the period of study. Two thirds of the allegations concerned victimization in the community context, whilst one third of the cases were subjected to Greek Law about Domestic Violence. Community violence concerned mainly males, both as victims (69%) and perpetrators(79%), whilst victimization in the domestic context concerned mainly females (87% of IPV allegations).
Robberies, disputes between neighbors and relatives (4th degree and above), and road rage were the four most common causes of the community allegations. Injuries to the face, the cranium, the thorax, the hands, and the legs were more frequent in victims of community violence, whilst injuries to the back, the thighs, and the feet were assessed more frequently in the domestic context. Statistical analysis based on the gender and the type of violence, showed that injuries to the neck, and the arms were more frequently observed at female victims of IPV.

**Discussion:** In contrary to the existing literature, our study showed that only neck, as long as arm injuries could be markers of women's IPV victimization. The role of the Forensic Pathologist is crucial in the judicial process of every case of interpersonal violence. Victims of IPV, child abuse, and sexual assaults require social support, in order to confront their abusers.

**ELDERLY HOME DEATH CASES, AS MEDICO-LEGAL CASES**

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Elderly homes are taking care for those who are not able to live on their own, they have medical and social functions as well hotel service functions. Many of the inmates live with severe chronic diseases, becoming physically and mentally dependent of the institutional services. We examined the unnatural or preventable death cases and those which raise the responsibility of the caring staff to evaluate the need of routine medico-legal autopsy in the elderly home death cases.

From 2014 we have performed the clinical and medico-legal autopsy of more than 1100 persons above the age 65 years, 87 of them were inmates of the elderly homes of the Szeged region. Autopsy was performed when the general practitioner, the physician on duty or the ambulance asked, or the death was reported to the police as a medico-legal case. We made a statistical analysis of the different types and causes of death.

The murder and the severe maltreatment cases were rare, but the accidents, the effectiveness or the use of protective measures, the professional supervision of the care raised numerous questions and tasks. Practically 50% of the cases were at least suspicious for unnatural death. The most problematic point was the “home accident”, which may belong to the unnatural and probably preventable death categories, but in the half of them the accident originated from a natural disease, and it was only the symptom of the terminal condition. In some cases – even it was reported to the authorities – they did payed attention to the clarification of the case, therefore only a clinical autopsy was performed. Other limitation of our study at this time that we don’t have information on the non-autopsied death cases yet, so we can’t guess the latency of possible other unnatural death cases.

The Ombudsman of Citizens’ Rights of Hungary carried out a general supervision over the elderly homes and concluded the same as we did: because of the institutional power over the dependent inmates in the elderly homes, it would be necessary to manage all death cases as medico-legal case to have an independent supervision over the quality of care and the circumstances of death.

**Key words:** death in elderly, unnatural death, death of inmates, medico-legal autopsy, death to be reported
CHILD ASPHYXIATION CAUSED BY ASPIRATED VITAMIN C TABLET

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Accidental cases of death from aspiration caused by laryngeal clogging with foreign body are common in children at the age of 3. Death in these cases occurs very quickly as a consequence of irritation of the laryngeal nerves and reflex heart failure, the general signs of suppression of the autonomic nervous system are either poorly expressed or absent, therefore the dying mechanism is determined based on the local autopsy finding and the circumstances of the case. In this article, we present one case of a 3 years old child who died from accidental aspiration of half vitamin C tablet. During the external examination of the child’s body, well-defined postmortem livid and hypostasis, cyanosis of the lips and the presence of white foam and blood in the nasal septum area have been identified. On autopsy a large amount of white foam content and a small piece of white tablet were found in the lumen area of the larynx. In our case, the vitamin C tablet was a fairly large foreign body, which had been accidentally aspirated in the lumen of the larynx, consequently caused spasm with swelling of the surrounding tissue after which tablet had stuck and had cause a stop of the airflow in the airways. Because of the high dose of ascorbic acid in the tablet, coagulation necrosis on the mucous membrane of the larynx was caused.

Keywords: suffocation, child, aspiration, ascorbic acid, foreign body, aspiration death.

CONTRIBUTION METHOD IN FORENSIC DIAGNOSTICS OF VIOLENT ASPHYCTIC DEATHS

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It is confirmed by numerous studies that there is significant change in morphology, viability, phagocytosis, metabolic activity and cytokines releasing caused by macrophages in experimental hypoxia. However, there are opposite results in some studies: some of them disapproved activation of macrophages particularly in protracted asphyxiation, while others found it in their studies. During autopsy exam of a girl which death was caused by asphyxia with prolonged agony, our results showed intra-alveolar macrophages in the peripheral and central parts of lungs. In case of death with short term agony, there were a significantly higher number of macrophages in the peripheral parts of lungs (subpleural). This data slightly differs from the results of other authors. In case of asphyctic death of a girl with prolonged agony was found substantial number of activated
T cells in lungs. Increased number of macrophages and T lymphocytes may represent a contribution method in forensic diagnostics of violent asphyctic deaths.

Keywords: Asphyctic deaths; Hypoxia; Lungs; Macrophages; T lymphocytes
POSTER PRESENTATIONS
POSTER SESSION 1
FREE TOPICS
Splenosis represents the condition of the ectopic multifocal presence of spleen tissue in individuals who have undergone splenectomy after splenic rupture. Small, residual fragments of a ruptured spleen are implanted most commonly in the abdominal cavity, usually on the omentum, but can be scattered throughout the body in different numbers and sizes.

Cases of splenosis present in the abdominal cavity and pelvis, retroperitoneal space, chest, subcutaneous tissue and skin, abdominal organs and other body structures have been reported in the literature. Occurrence of splenosis in the chest, pelvis, and retroperitoneal space is associated with a simultaneous rupture of the spleen, diaphragm, and parietal peritoneum, while its appearance in the skin and subcutaneous tissue binds to a gunshot wound that injures the spleen and skin at the exit of the body.

From a clinical point of view, a significant decrease in the immune response to infection of the organism by various bacteria was observed in individuals with splenosis, which in some cases caused sepsis and rapid death.

Splenectomized patients are at greater risk for many long-term consequences, including cardiovascular disease, portal vein thrombosis, and possibly increased rates of malignancy. The most well-known complication of splenectomy is excessive postsplenectomy infection where the body, which lacks critical spleen immune function, is quickly overwhelmed by the infection. A similar situation develops in persons with splenosis.

The case of a young male in whom a banal throat infection, which occurs in the morning, during the morning leads to a drastic deterioration of the general condition and the rapid onset of death, in addition to the medical assistance provided in a tertiary health care institution, is presented. Autopsies, with slight inflammatory changes in the pharynx, determine the condition of sepsis and record numerous mosquito changes, size to kernel grain, dark gray-bluish color, scattered throughout the abdominal cavity, mostly firmly adhered to the mesentery of the small and large intestine. Other characteristic changes were not observed on the other organs and body structures during autopsy. Histological preparations, made by the classical procedure from samples of such bipedal changes from the abdominal cavity, stained with the HE method, showed the spleen tissue under a microscope. Subsequently, it is learned that the person in his childhood had a car accident in which he suffered a spleen rupture which was surgically removed.

Keywords: splenosis; sudden death; young adult; sepsis.
DEATH CERTIFICATION

Noun Mustapha, M. Djilali Merzoug, O. Hadjazi, I. Belhadj, A. Boublenza

**Background:** The death certification continues to be debated within the medical profession and the judiciary one, as well. To sign such a document is not a trivial procedure and it can result in serious consequences, such as administrative and judicial hassle, medico-social concerns, epidemiological complications etc...

The aim of this work is to elaborate improvement proposals of the death certification.

**Methods:** The investigation was documented from death certificates signed by GP that led to a Forensic autopsy at the Forensic unit of the University Hospital of Sidi Bel Abbes. We have analyzed A total of 50 death certificates between January 2014 and April 2014.

**Conclusion:** Based on the results of this study we emphasize on the contact of GP with forensic pathologist and on the continuous medical training for GP. Finally, it is important and advisable to give more power to the forensic pathologist.

**DUODENAL WALL HEMORRHAGE AND HEPATIC LACERATION: REMARKABLE SIGNS IN HANGING?**

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A 48-year-old man, suffering from depression, committed suicidal hanging at his house. The ligature was made of rope fixed to the wooden timber. An autopsy was performed 12 hours following death. The deceased was 171 cm tall, and weighed 80 kg, (BMI 27.4kg/m²). It was untypical, complete hanging, fixed ligature knot was on the right side of the neck. The furrow was below Adam’s apple.

Autopsy revealed longitudinal lacerations on the liver with subsequent intraabdominal hemorrhage (approximately 200 mL liquid and clothed blood), and subserosal hemorrhages on the anterior duodenal wall. Other autopsy finding included bilateral hemorrhages at the periosteal-clavicular origin of the sternocleidomastoid muscles, thyroid cartilage and hyoid bone fractures. Simon’s bleeding in the region of the lumbar spine was prominent.

Differential diagnosis of gastrointestinal hemorrhage at an autopsy should include mechanical trauma, hypothermia and hypoperfusion - related hemorrhages, coagulopathies, sepsis, and those of diapedetic origin. Previous studies presuppose two hypotheses for gastrointestinal bleeding in cases of hanging. The first hypothesis assumes abdominal congestion with acute dysregulation of circulation leading to hemorrhagic infarction of the intestinal wall, whereas the second one suggests that prolonged agonal period may lead to splanchnic congestion by acute vegetative and hypoxemic circulatory dysregulation with consequent fluctuation of blood pressure and heart rate.
Hepatic lacerations, in cases of hanging have not been previously mentioned in the literature. In our case lacerations were located on anterior surface of medial part of the right and lateral part of the left lobe, adjacent to the caudal end of falciform ligament; they were linear, about 3 cm in length and up to 0.5 cm in depth. Perhaps there was adhesion between the lobes of the liver which was ruptured during the stretching forces, with consequent damage of the hepatic tissue and hemorrhage in the abdominal cavity. We assume that plausible explanation for observed hepatic lacerations could be related to the existence of adhesions between the right and left liver lobes that, due to the stretching forces have caused observed hepatic lesions.

In cases of hanging, after exclusion of other causes, hepatic laceration and bowel wall hemorrhage could be considered as signs of vitality in conjunction with previously known signs.

**Keywords:** forensic, hanging, duodenal hemorrhage, hepatic laceration, autopsy

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**FATAL SUICIDAL FALLS FROM HEIGHTS**

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**Introduction:** Falls from heights represent the most common way of committing suicide, along with hanging. According to the European Alliance against Depression, jumping from heights is the third most recurrent method of committing suicide in Europe, after poisoning and hanging. Suicidal falls from heights result in diverse injuries which are dependent on a number of factors such as height of the fall, age of the victim, victim’s body position or feature of the surface on which the victim falls. The injuries from falls from heights usually involve multiple organs.

The aim of this study was to describe most common the injury pattern in fatal suicidal falls from a height.

**Material and methods:** The study included 25 bodies of victims of suicidal falls from different heights who were subjected to medical legal autopsy at the Institute of Forensic Medicine and Criminalistic in Skopje, between years 2014 and 2018. The height of falls was divided in three groups (less than 7 m, from 7 to 20 m, more than 20 m). For each fall, certain data were collected, including gender, age, injury types and presence of alcohol and intoxicants in blood. The analysis comprised of prevalence of skeletal damage including fracture of scull, upper extremities, lower extremities, ribs and spine, pelvis, sternum, clavicula and scapula, and internal organ damage including cerebrum, lungs, heart, aorta, liver, spleen, kidney and intestine with mesentery. The study was focused on identifying the frequency of occurrence of different injuries in relation to the height of fall.

**Results:** Twenty fives suicides due to falls from height occurred in five year period. There were 18 male and 7 females. The age of the victims ranges from 11 to 80 years. It was identified that the number and extent of injuries increases along with the height of fall. The most frequent skeletal...
damage was fracture of ribs and spine, and liver was the most frequently damaged internal organ. The most frequent cause of death was traumatic shock, followed by cerebral injuries.

**Conclusion:** There is no common method to describe the injury pattern of suicidal victims from falls from heights. Each case should be individually measured, within the frame work of victim’s history in conjunctions with findings at the death scene and toxicology results.

**Keywords:** suicide, fall from heights, forensic pathology, injuries.

**FORENSIC IMPLICATIONS OF GIANT INTRAPERICARDIAL LIPOMA: AUTOPSY CASE REPORT**

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We present a case of an 80-year-old female who was injured when falling from standing height a day after experiencing a syncopal episode. On admission to hospital, she presented with dizziness, breathlessness, and chest pain. Before any other diagnostic procedures were conducted, she suddenly died. At the autopsy, during the internal examination of the thorax, a dilated and tense pericardium filling up a large part of the chest cavity was noted. A well-encapsulated soft tissue mass 20x18x3cm in size, measuring 820 g, was present intrapericardially. The tumor was free in the pericardial sack, connected to the left atrium, just behind the auricula (appendage), by a vascular peduncle. The histological examination of the tumor was composed of mature fat cells with no evidence of malignancy. Important finding was ischemic area in the interventricular cardiac wall, advanced hypertensive and atherosclerotic heart disease (heart weighed 500 g, left ventricle thickness was up to 17 mm). The histological examination of the heart showed early ischemic myocardial lesion. Additional findings included multiple bruises and excoriations on the left side of the face and fracture of the left radius. The myocardial infarction was considered as immediate cause of death.

Lipomas are common benign tumors, but rarely seen intrapericardially. They can cause life-threatening complications by rapid growth, and therefore, clinically, may be considered as malignant.

In the presented case, the coronary atherosclerosis was, most likely, sufficient to cause a myocardial ischemia, but the mass effect of the large lipoma could have decreased both the blood supply of the heart muscle and diastic filling. A question arises as to whether the intrapericardial lipoma pressure is enough to stop the blood flow through the coronary arteries. Or, if calcified atherosclerosis, precisely the stiffening of the wall preventing their lumen to collapse, could be a protective factor in cases like this. In this case the role of lipoma in the fatal outcome can be only assumed. In the absence of morphological changes in the heart, lipoma probably would be considered as underlying death.
Even though intrapericardial tumors are benign, they can cause heart disorders and even sudden death. Keeping in mind the fact that the real incidence of intrapericardial lipomas in the general population is unknown full autopsy examination in cases like this is of great importance.

**Keywords:** intrapericardial lipoma, sudden death, forensic, autopsy

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**FORMALIN-FIXED PARAFFIN-EMBEDDED HEART TISSUE AS SOURCE FOR DNA TYPING ANALYSIS IN FORENSIC INVESTIGATION**

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Formalin fixed, paraffin embedded (FFPE) tissues are a valuable source of DNA in molecular autopsy. The use of this tissue has certain limitations because DNA isolated from FFPE tissues is often degraded due to the cross-linking of nucleic acids and proteins. The objective of this study was to evaluate the impact of storage period of FFPE blocks with human autopsied heart tissue on yield, purity and integrity of isolated DNA.

One hundred eighty FFPE tissues blocks stored in archive of Department for Forensic Medicine and Toxicology, KC Kragujevac, Serbia from 1988 to 2017 were analyzed. Healthy human heart tissues excluded during autopsy were fixed in 4% non-buffered formalin for 24 h and embedded to paraffin. DNA isolation involved tissue deparaffinization with xylene, followed by tissue digestion with TNS buffer and proteinase K, and DNA purification using phenol-chloroform-isoamyl alcohol. The yield and purity of isolated DNA was obtained spectrophotometrically, measuring absorbances at 260 nm and 280 nm. The PCR amplification of GPD1 (150 bp), ACTB (262 bp) and RPL4 (407 bp) genes were performed to evaluate the degree of DNA fragmentation. The amplicons were visualized using agarose gel electrophoresis.

The yield and purity of isolated DNA were satisfactory. The average DNA yield was 167.87 ng. The average purity of DNA was OD260/280=1, 97. The RPL4 gene was amplified in 3% to 57% of samples up to 5 years, ACTB gene in 7% to 100% of samples up to 25 years and GPD1 gene in 13% to 100% of samples up to 30 years of storage FFPE blocks.

Although the results indicate that integrity of DNA decreased with increased storage periods of FFPE blocks, the DNA isolated from healthy human autopsied heart FFPE tissues is suitable for subsequent forensic analysis even after 30 years of storage.

**Keywords:** DNA degradation, formalin-fixed paraffin-embedded tissue, heart tissue, autopsy, PCR
SUICIDAL HANGING RESULTING IN COMPLETE DECAPITATION:
A CASE REPORT

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Death from „typical” suicidal hanging is usually caused by cerebral ischaemia due to compression of the carotid arteries. A fall with a noose around the neck is associated with more frequent injuries to cervical structures. Complete decapitation is an unusual complication of suicidal hanging that can occur in rare cases under extreme conditions (heavy body weight, special rope material, fall from a great height). We present a case of suicide hanging resulting in complete decapitation following a fall of 5m. The 53-year-old male victim with a 120kg body mass used a 3.0cm thick and 2.8m long polyester webbing sling hooked to a branch. Thorough scene examinations were performed, and photographs from the scene were available. Autopsy findings were a sharp decapitation wound with circumferential skin abrasion, soft tissue injuries, fracture of the hyoide bone and the thyroid cartilages, cervical spine transection between C2 and C3 and spinal chord dissection. The comprehensive literature review of complete decapitation by suicidal hanging emphasises the importance of investigation of biomechanical process. In the presented case we calculated the physical parameters and compared them with other cases found in literature.

Keywords: decapitation; hanging; suicide; forensic pathology; biomechanics

WHEN THE SUICIDE TOUCHES THE SCHOOL (ABOUT A CASE OF AUTOPSY)

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Introduction: Violence in schools is a form of child abuse; it has been gaining momentum for several years, from mere harassment to crime and suicide. School-based violence is a global problem keeps growing more and more in numbers, but also in types of injury observed by caregivers. By their characters, the wounds become more serious sometimes leading to lasting infirmities.

Aim of work: Our objectives in this study devoted to:
- Sensitized the whole staff (education and parents) to interact with their children.
- Monitored the pupils more closely.
- Make a thorough external examination when ascertaining deaths and autopsies (forensic Doctors).

Methods: We have been working on school violence four years; it has been observed that there are a very high number of victims who suffer from psychological problems rather than physical ones.

At the consultation, the reason is often violence against pupils of different ages and levels.
Physical injuries are treated, and the psychological and psychiatric component is omitted, which has very serious consequences (absence or insufficiency of psychological care associated).

Our case is one of the most serious complications of school violence experienced by a 14-year-old girl.

Results and Conclusion:
- This is a 14-year-old girl with no particular antecedents who were repeatedly harassed at her institution; moral preaching has caused him moral and psychological difficulties.
- In an acute respiratory distress chart; she died. An indeterminate death certificate was issued and an autopsy was performed.
- An intoxication syndrome is observed at the beginning, but the exploration has shown mechanical asphyxia.

Keywords: school violence, school failure, suicide

MOLECULAR ANALYSIS OF THROMBOPHILIC GENES IN FATAL PULMONARY THROMBOEMBOLISM - A RETROSPECTIVE STUDY

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Clinical manifestations of pulmonary embolism, one of the most frequent cardiovascular diseases, vary widely, from asymptomatic to sudden, unexpected deaths. General etiological factors include age, immobilization, surgery, history of venous thromboembolism, use of oral contraceptives, pregnancy, as well as the presence of single-nucleotide polymorphisms in hemostasis-related genes, leading to a higher risk for thrombotic events.

We describe 74 fatal female cases of pulmonary embolism as confirmed by post-mortem examination at the Institute of Forensic Medicine, University of Belgrade in the past 12 years. Control group consisted of healthy females with no history of thrombosis or cardiovascular disease. The aim of our study was to analyze inherited thrombophilic gene variants in order to define the genetic contribution in sudden death caused by thrombosis. We performed Real Time PCR reaction with commercially designed TaqMan assays to genotype 7 polymorphisms: FV 1691G>A, FII 20210G>A, MTHFR 677C>T, MTHFR 1298A>C, ATIII786 G>A, PAI-1 4G/5G and FXIII Val34Leu.

In 24 out of 74 cases (32.43%) it was not possible to find the thrombotic site. In all remaining cases the involvement of the deep veins of one or both legs were observed of which 3 (4.05%) were with femoral thrombosis, while 47 (63.51%) were with posterior and anterior tibial thromboses. Six (8.1%) patients were obese, 66 (89.2%) were more than 50 years old at the time of the event, and malignancy was present in 3 patients (4.05%). In addition, all patients were hospitalized because of major trauma and underwent antithrombotic prophylaxis following surgery. Results of genetic analysis in our study have shown a significant association between Factor II 20210G>A mutation and sudden death caused by pulmonary thromboembolism. In our cohort, 4 patients (5.4%) were heterozygous (AG), compared to no detected mutation in control group (p=0.04). Three of these patients had normal body weight and were non-smokers, with
previously diagnosed cardiovascular disease which might indicate an association with genetic factors. Other analyzed polymorphisms in our study did not differ between patients and controls.

Our study highlights the relevance of a comprehensive methodological approach that includes integration of clinical data, autopsy findings and genetic testing. Additionally, our results imply that analysis of inherited thrombophilia could be useful for FII prothrombin mutation as a significant factor that contributes to sudden death caused by pulmonary thromboembolism.

**KEYWORDS:** retrospective study; autopsy; pulmonary thromboembolism; inherited thrombophilia; gene polymorphisms

**PATERNITY EXCLUSIONS AT THE DEPARTMENT OF FORENSIC MEDICINE, MEDICAL UNIVERSITY OF BIALYSTOK (POLAND)**

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There are two possible outcomes in a DNA paternity test: 1. paternity inclusion if the report states that the tested man is not excluded as the biological father of the tested child, and 2. paternity exclusion which indicates that the tested man is not the true biological father of the child.

The aim of the study was analysis of frequencies and structure of paternity exclusions in the archived material of the Department of Forensic Medicine, Medical University of Bialystok over the period of 2008-2018. The review was based on reports involving the results of paternity tests for putative father-child-mother trios. DNA samples were extracted using QIAamp DNA Mini Kit (Qiagen). DNA quantification was performed with Quantifier Human DNA Quantification Kit and 7500 Real-Time PCR System (Applied Biosystems). DNA templates were amplified with Identifiler Plus PCR Amplification Kit and PCR System 9700 (Applied Biosystems). The products were analysed using the 3130 Genetic Analyser. For respective years the analysis of frequency and structure of paternity exclusions was performed. Exclusion frequencies for respective alleles were compared considering observed values of exclusion efficiency. Frequency distributions of excluding alleles were compared with the north-eastern Polish dataset.

In cases of disputed paternity investigated by DNA analysis in Poland, it is accepted that at least four independent exclusions be observed before concluding that a putative father is not the biological father of the child. A total of 187 exclusions were revealed out of 958 cases examined. Over the period analysed almost two-fold decrease in the number of paternity tests was observed, while the percentage of exclusions in particular years varied significantly (33.9-13.3%), at the average of 26.3%. The highest observed exclusion efficiency values were showed by D18S51 (0.7166) and FGA (0.7059), the lowest by TPOX (0.3048). The highest proportion of exclusions (19.8%) was based on mismatches in nine loci. No cases with mismatches in all 15 loci were noted. Based on data from case files we found that 53.3% of the exclusions applied to non-matrimonial
children. The investigated set of 15 markers proved to be an effective tool in genetic paternity tests in context of the accepted exclusion rules.

**Keywords:** paternity exclusion, STR *loci*, Identifiler Plus, Polish population

**THE PSYCHOLOGICAL AND PSYCHIATRIC COMPLICATIONS OF SCHOOL VIOLENCE IN THE CITY OF SIDI BEL ABBES (120 CASES REPORT)**

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**Introduction:** As there are different definitions of violence and violent extremism; Schoolchildren also endured these types of violence. Knowing that physical violence is apparent, other psychological and psychiatric complications are very difficult to put into evidence because of their complexities.

**Objectives:** are multiple on our studies of 120 cases of victims:
- To highlight the psychic and psychiatric lesions of the victims.
- Take charge of all physical injuries too.
- Find the cause of violence among abusers.
- Try to do psychotherapy sessions of groups (pupils-teacher-administrators).

**Results and conclusions:** On a research that lasted one (01) year, with the pupils of the city of SIDI BEL ABBES, it has been observed that, out of 120 pupils (who came on medico-judicial requisition), at least (20-25)% suffer psychological and psychiatric complications associated or not with physical injury.

The place where the violence was the class, the court or next to the school, the perpetrator in 55% of the cases was the teacher, 35% were the students between them and the rest were the administrators.

The majority of pupils had a sleep disorders (insomnia), anxiety, enuresis; And 02% found great difficulty to return to class. In conclusion, that all of the pupils had a psychological and psychiatric disorders after violence school, but mostly the pupils have taken their lessons normally possible.

**Keywords:** violence in schools, psychological and psychiatric complications, school failure

**FATAL INJURY BY AIR GUN: A CASE REPORT**

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**Declarations**

**Ethical approval**
This investigation was approved by Ethical Committee, Faculty of Medicine Osijek, University of Osijek, J.Huttlera 4, 31000 Osijek, Croatia

**Consent for publication**
Not applicable.
Availability of data and material
All data generated or analysed during this study are included in this published article (and its supplementary information files).

Competing interests
The authors declare that they have no competing interests.

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Authors' contributions
B.D. conceived the presented idea, developed the theory and performed the computations, conducted and analysed data acquisition process, and discussed results with all authors.
J.R. searched literature, analysed and interpreted data, and took the lead in writing the manuscript.
D.P. conducted data acquisition process, designed data acquisition and statistical analysis.
T.D. searched literature, analysed and interpreted data and shaped the final manuscript for submission.
All authors have approved the submitted version of our case report.

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Background: The popularity of air weapons is increasing. They are often viewed as toys, rather than potentially lethal weapons. Regulations on purchase and ownership of air weapons differ from country to country. The majority of fatal and non-fatal air gun accidents involve children less than 16 years of age.

Case presentation: In this report, we present a fatal case resulting from an accident involving an air gun. An accident happened between two brothers aged 9 and 7 and was initially considered to be a traumatic wound inflicted by falling on a scooter handle. Luckily, upon the arrival of an experienced police inspector, the cause of child’s death was called into question and it was discovered that unlicensed, loaded air gun was left unattended in a backyard shed. It was later established that the cause of death was a fatal gunshot wound to the chest and a pointed lead pellet was found in the boy’s liver.

Conclusions: The public and governments should be advised that air guns can be dangerous weapons which may cause serious injuries and even death. We believe that air guns should be regulated by the same laws that apply to firearms.

Keywords: accidents; death; weapons; wounds and injuries; wounds, gunshot
EXTREME INTIMATE PARTNER VIOLENCE - A CASE REPORT.

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Intimate partner violence (IPV) causes major physical and psychological health problems worldwide, with majority of the victims being women. Homicide is certainly the most extreme form of IPV. In certain percentage of cases, after committing a homicide, perpetrator commits a suicide. Such homicide is categorized as a homicide – suicide (HS). In general, IPV is the most common cause of HS worldwide. If the number of victims in HS scenario is greater than four, it then fall under the category of a mass murder – suicide (MMS). We present a case of a MMS with both intimate partner violence and homicide components. With six homicide victims, it is the largest mass murder in the history of peacetime Croatia.

Keywords: domestic violence; intimate partner violence; mass murder; homicide; suicide.

INTENTIONAL POISONING WITH LETHAL OUTCOME AFTER ABUSE OF GHB AND ANTIDEPRESSANTS– CASE REPORT

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Gamma-Hydroxybutyrate (GHB) is central nervous system depressant which is produced endogenously in trace amounts up to 1mg/L. It has been used to treat narcolepsy associated disorders and withdrawal symptoms in alcoholics. On the other side its depressant effects have been abused and today GHB presents easy available and widely used recreational drug of abuse. It has narrow therapeutic window and there is thin border between euphoria and disinhibition and severe cardiorespiratory effect. GHB has short half life time (30-50 min) and relatively short detection time (3-10h). It’s toxicokinetic profile is reason why is so difficult to detect GHB in biological samples of acutely poisoned or deceased persons.

Blood, vitreous humor and gastric content of 36 years old male, found dead in the woods, have been admitted to laboratory of toxicology. Samples were prepared by acid liquid – liquid extraction with ethyl acetate, evaporated to dryness and derivatized with BSTFA with 1% TCMS and analyzed by gas chromatography with mass spectrometry (GC-MS). Quantification was performed using following ions m/z 233, 147, 117.

GHB blood concentration was 876,50 mg/L. Antidepressants fluoxetine and sertraline ware also detected in toxic concentrations. Toxic concentrations of GHB and antidepressants as well as their pharmacokinetic interaction were the cause of violent death.

The number of GHB related deaths is in constant increasing. GHB and its precursors are serious public health problem. Also, it is a big challenge for forensics to detect and interpret GHB postmortem concentrations.
When Edward Bulwer-Lytton in 1839 in his play Richelieu wrote that the pen is mightier than the sword he probably couldn’t have imagined that one day that sentence might be true not just in metaphorical but in the literal sense too. During World War II, the Americans put a lot of effort into developing new easily conceivable but no less deadly weapons. One of the developed weapons was one-time, single shot, striker-fired, not-reloadable weapon, the so-called Stinger pen gun. Over the years the design and specifications such as caliber and firing mechanism changed depending on the manufacturer and desired purpose. Reviewing the literature, we found a few reported cases of fatal pen gun injuries that were mostly accidental and usually caused by a tear-gas or flare pen guns. Here we present the case of a firearm injury caused by a homemade pen gun with unusual entry wound site. A 38-year-old man was found dead in his apartment with signs of bleeding from the nasal cavity. The police found a homemade pen gun near the body and investigation led the officers to believe the man committed suicide with a small-caliber weapon, although inspection of the body at the scene revealed no entry wound. At the autopsy traces of dried blood were present on the face and right side of the head. After washing off the dried blood no wounds could be seen on the face or anywhere on the head. Oral and nasal cavity were also examined but no wounds were detected. At closer inspection it was noticed that traces of blood even after washing could only be observed in the right ear, and alas the entry wound was found! It was located at the beginning of the right external auditory canal. Because of the peculiarity of the entry site typical entry wound characteristics could not be detected, although soot deposits were seen on some of the torn skin fragments. Upon opening the cranial cavity the gunshot channel that went through the pyramid of the right temporal bone was revealed. No bullet was found as the bullet disintegrated when it hit the bone. Instead, small metal fragments, as well as bone fragments, were found dispersed in brain matter.

**Keywords:** forensic medicine; firearm injury; pen gun; entry wound
POSTER SESSION 2
FREE TOPICS
COMPARATIVE ANALYSIS OF RESULTS OF THE ALCOHOL TEST AND BLOOD ALCOHOL CONCENTRATION VALUES

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Introduction: The diagnosis of alcohol levels is set by a medical examination, chemical-toxicological analysis of blood and urine, as well as by determination of the presence of alcohol in exhaled air. One of the methods for determining blood alcohol concentration is the enzymatic (ADH) procedure (spectrophotometric analysis). There are, however some errors that can occur during collection, transportation and chemical-toxicological analysis of blood samples. Reliable results can be obtained from the analysis of fresh blood sample. Aim: To determine the presence of alcohol in the driver's blood and compare the results of breath analysis with the results of blood ADH enzymatic method. Materials and methods: The study included 297 drivers who were tested for DWI (driving while intoxicated) after which their blood was analyzed by using ADH enzyme methods in the laboratory of the Institute for Health Protection of Workers at the Ministry of Internal Affairs (MIP) in Belgrade. Respondents were of both genders, aged 16 to 66 years. The obtained results were presented in tables and graphs. The following methods were used in data processing: mean value, standard deviation, tri-factor ANOVA with the nesting factor and Pearson correlation. Results and discussion: The comparison of the results obtained by measuring the alcohol concentration in exhaled air with the results obtained by determining the alcohol level using the enzyme ADH method was established by extremely high correlation coefficient of 0.95 (p = 0.198, p <0.0006). This is proof of DWI test reliability. There are random cases that show inconsistencies in the results of the aforementioned two methods of determining alcohol intoxication (up to about 1 ‰). Detention of drunk drivers is immediately imposed in cases where the traffic police have determined that the driver's blood alcohol level is bigger than 2.00 ‰ by breathalyzer test. Complaints about the shortcomings of the ethylometer in terms of inability to store the sample, in our opinion are without solid ground simply because there is a possibility of connecting the ethylometer to the printer. In this way, this simple and inexpensive process can provide the necessary evidence for further action. The current situation in our justice system is characterized in most cases by long and procrastinating procedures due to the lack of solid evidence. By accepting the probative value of the breathalyzer test the situation could improve in terms of shortening the legal procedures and saving money. Conclusion: Alcohol concentrations determined by breathalyzer test do not differ significantly from those determined by blood analysis which suggest that there is a practical side of breath testing as a reliable diagnostic method.

Keywords: DWI testing, alcoholemia, enzymatic ADH method.
Powdered roots of iboga (Tabernanthe iboga) contain ibogaine, powerful alkaloid widely used nowadays. Firstly, it was used in certain African tribes during complex initiation rites in the presence of the tribe and accompanied by music and dancing. Today, ibogain, as the not licensed anti-addictive remedy, is widely used as an anti-addiction medication in alternative medicine in medical and nonmedical settings worldwide. Moderate doses (from 100 mg to 1 g of ibogaine) most commonly cause trance-like visual and auditory hallucinations, along with auditory, olfactory, and gustatory synesthesia.

We report the case of a heroin addict who died suddenly 5-12 hours after oral ingestion of a powder labeled Tabernanthe iboga bought online and used during an anti-addictive detoxification treatment. He was found dead in the private rented apartment, where he was on an anti-addictive treatment.

External examination found no lesions other than non-specific injuries on the legs. The autopsy showed congestion of internal organs and pulmonary edema. Histopathological analysis of the heart showed no macroscopic or microscopic abnormalities. The concentration of ibogaine was 3.26 mg/l. Moreover, systematic toxicological analyses of biological samples showed the presence of morphine and codeine. These data suggest that the death, which occurred violently after initiation of the “treatment”, was probably due to the cardiovascular effects of the ibogaine powder.

The presented case highlights the worldwide problem of products widely available over the internet and the danger associated with their consumption.

KEYWORDS: forensic science; toxicology; ibogaine; substance abuse; opioid detoxification

DIFFICULTIES IN MODERN FORENSIC TOXICOLOGY

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In many forensic autopsy cases, toxicological tests are needed to detect the underlying substance leading to the poisoning, and to determine the exact cause of death. However, modern forensic toxicology has difficulties in detecting small molecules, ions or organic metabolites. We introduce three cases, where the death scene investigation and classical forensic medical approach helped to determine the fact of the fatal poisonings.

1. A 47-year-old woman was transferred to the Emergency Unit. The performed examinations revealed 3rd grade AV block and a 9.8 mmol/l serum potassium level. After an acute circulatory collapse death was declared. The significant hyperpotassemia, the patient’s history of multiple suicide attempts raised the suspicion of potassium self-poisoning. During autopsy a big quantity
of bluish medicine granules were found in the stomach. With the aid of analytical toxicology serum potassium level couldn’t be quantified. Further investigations in cooperation with clinical toxicology wouldn’t have brought reliable results considering the hemolisation of the blood sample.

2. A 41-year-old woman was found dead in her flat. Upon arrival, the authorities identified in her surrounding numerous suicide notes, a “Sodium nitrit 99,5%” labelled box and a mixing glass. External examination revealed the deep-purple discoloration of the skin. Internal examination uncovered the pooling of blood in the internal organs. Unfortunately, neither the quantification of blood sodium-nitrite levels nor the identification of methemoglobinaemia was possible locally. The forensic expert opinion defined the cause of death as sodium-nitrite induced methemoglobinaemia based on scene and autopsy room findings.

3. A 60-year-old man was found in his bed without any signs of life. During the death scene investigation, a package of 1 kg "QUCKPHOS" insecticide chemical tablets were found. During the autopsy a large amount of greyish pasty residue was apparent in the stomach, and the internal organs were very congestive. The insecticide found on the scene consisted of aluminium-phosphide, which is a highly toxic inorganic compound. The acid in the digestive system reacts with the phosphide to generate the toxic phosphine gas. Blood and urine samples cannot be used for phosphine detection, because absorbed phosphine is rapidly oxidized and excreted mainly as phosphite and hypophosphite in the urine.

In conclusion we highlight that in certain cases circumstantial evidences implement the most considerable diagnostic contribution. The particular examination of autopsy findings, the results of pre-mortem investigations, the exhaustive control of the death scene are precious supports in the determination of the cause of death.

Keywords: toxicology; poisoning; potassium; sodium-nitrite; aluminium-phosphide

EPIDEMIOLOGICAL STUDIES OF SUICIDE WITH THE USE OF SELECTED TOXICOLOGICAL FACTORS IN POLAND IN 1999-2018

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Suicide is one of the most important health problems on a global scale. In each country, this problem has its own specificity associated with the impact of various and variable social, political, cultural and economic factors over time. According to WHO data, Poland occupies one of the leading places in Europe in terms of the number of suicides per 100,000 inhabitants. The aim of this work is epidemiological studies of suicide cases with the use of selected toxicological factors.
The presented research is a cross-sectional analysis of suicide cases found in Poland in the years 1999-2018 based on the data of the National Police Headquarters (NPH) and the Central Statistical Office (CSO). During this period, the method of collecting information on this issue changed three times, which was taken into account in the conducted research. Statistical analysis was performed using SPSS-22 software.

In Poland, in the years 1999-2018, 137,681 suicides were found, of which 95,721 (69.52%) were fatal. During this period, 10,371 suicide attempts (7.5% of the total suicide) occurred as a result of ingestion of the poison, of which 1,892 (18.2%) were fatal. In the years 1999-2016, the poisoning category included gas intoxication, poison and sleeping pills poisoning, while in the years 2017-2018 the poisoning category was expanded and included, among others: gas / exhaust gas poisoning, chemical / toxic poisoning; taking sleeping pills / psychotropic drugs; taking other medicines; intoxication with drugs of abuse and new psychoactive substances. In the years 1999-2016, suicide and suicide attempts as a result of poisoning were recorded in a total of 5,923 cases, of which 12.71% as a result of gas intoxication, 9.96% poisoning and 77.33% sleeping pills. In the years 1999-2018, according to the CSO data, the consumption of pure alcohol per capita increased from the level of approx. 7-8 liters in 1999-2005 to the level of 9-10 liters in 2006-2018, which was also reflected in the increase in the number of suicides after consumption alcohol. Based on incomplete data, it can be assumed that every fourth suicide in Poland was under the influence of alcohol or psychoactive substances.

In summary, it should be stated that in Poland the number of suicides, including those resulting in death due to poisoning, is systematically increasing. The highest suicide values, including as a result of poisoning, were recorded in 2017 and 2018. Therefore, it is necessary to introduce into routine forensic medical practice toxicological tests of urine samples taken during autopsies not only for alcohol content, but also drugs of abuse. The methodology used for toxicological testing should also take into account the requirements of ISO 17025: 2017.

**Keywords:** suicide, poisoning, sleeping pills, drugs of abuse, new psychoactive substances, alcohol
FIRST CASES OF FATAL INTOXICATIONS IN COCAINE BODY PACKERS IN MACEDONIA: CASE REPORT

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A method of drug trafficking called Body Packing gained its popularity in the 1970’s, and it refers to the intracorporeal concealment of illicit substances. “Body packers” usually swallow wrapped packages of illicit powdered drugs for the purpose of smuggling and they are also referred to as “Drug Mules”. The most often transported drugs with this method are cocaine and heroin. Illegal substances are usually wrapped in packages and then swallowed by body packers, when they arrive to the assigned destination they release them by defecation. The most common fatal consequence of body packing is acute intoxication due to rupture of packages in the body. In this report we present two cases of acute cocaine intoxication in two young man transporting cocaine. The first man 33 years old was a text book body packer coming back home from abroad traveling with a train, and near the city of Veles he collapsed in the train after which he was transferred to the general hospital where he informed the medical staff he had swallowed cocaine, they started treatment but the patient experienced seizures and went in to coma, and short after he went in to cardiac arrest. At autopsy we removed 5 sachets from his intestines, one of which was ruptured and almost all of the content was spilled out. In the other case the man 32 years old was caught at the eastern border under the suspicion that he is transporting drugs, at one point while police officers were behind the glass door of the interrogating room he managed to swallow a sachet with white powdered substance he was carrying with him, damaging it in the process, after which he died in the next hour. At autopsy we found his nostrils were field with white powdered substance, the same substance was found in the gastric content, partially dissolved. Cocaine use in Macedonia has been on the rise for the last two years, and although it was more of an upper class drug it has become more available on the streets. The cases of the body packers coincide with the higher incidence of cocaine poisoning in the routine cases of drug abusers. The treatment of body packers is difficult and complex, so the health care professionals should be aware of this new trend in our country and be able to recognize the symptoms in such cases.

Keywords: Cocaine; Trafficking; Body packing; Acute intoxication

METHADONE AND PRESCRIPTION DRUGS

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Introduction: The statistics found in this study show that in developed countries, the number of heroin addicts and other abused opioids decreases, but on the other hand, the abuse of prescription drugs increases.

Methods: At the Institute of Pathology and Forensic Medicine, Military Medical Academy, the documentation analysis for the period from 2015 to 2018 year was conducted. Autopsy findings
in which Methadone’s presence was detected by toxicological analysis in body fluids and organs were selected.

**Results:** In 10 autopsy findings, the presence of Methadone was detected by toxicological analysis of the samples (0, 944 ± 0.122 mg/L in the blood, 3.911 ± 1.22 mg/L in the urine). All subjects were male, aged 18 to 36 (24.5±7.7). Alongside Methadone, heroin was detected in two cases and the presence of drugs was detected in eight cases. In two cases, beside Methadone, only one drug form the group of anxiolytics was present, and in the other cases, alongside Methadone the presences of 2 to 6 other drugs was detected. Drugs which were found were from the groups of anxiolytics, antidepressants, antipsychotics, anticholinergics and analgesics. In five cases, beside Methadone and drugs, ethyl alcohol was also present. In 4 cases (40%), lethal dosage of methadone was not found and every other cause of death was excluded therefore the lethal outcome was the result of additive effect of Methadone, psychotropic drugs and alcohol.

**Conclusion:** Therapeutic use of Methadone carries with it the risk of leading to a lethal outcome if it is being consumed on it’s own or in the combination with other psychotropic drugs. It is evident that polytoxicomania and abuse of prescribed drugs is increasing, therefore better control of prescription is necessary.

**Key words:** methadone, addiction, drugs, prescription

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**POSTMORTEM REDISTRIBUTION OF HEROIN AND ITS METABOLITES IN DIFFERENT MEDIUMS**

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Postmortem toxicological sampling is routinely used in the evaluation of forensic cases. However, the assessment of the results has not yet been fully clarified. Postmortem redistribution appears to be the main reason for the complex results, and postmortem redistribution is one of the most frequently researched topics of postmortem toxicology. Although it is known that it is affected by many factors, one of the important questions is that how much effect the factors cause. Therefore, we aimed to investigate the interaction of heroin metabolites which is commonly used and investigated in literature with medium and time using fresh and salty water.

Forty-eight New Zealand rabbits were sacrificed one hour after the heroin infusion and antemortem blood samples were taken, they were left for 30 min, 2, 6, 12, 24 hours in fresh water (n: 15), salty water (n: 15), and air (n:15). Central and peripheral blood, vitreous humour and bile samples were then obtained by autopsy and measurements of 6-monoacetylmorphine, morphine and morphine-3-beta-glucuronide were performed by LC-MS/MS.
The results of the analyzes showed that the medium change had significant effects on central and peripheral morphine-3-beta-glucuronide concentrations, postmortem interval were responsible for the postmortem redistribution of heroin metabolites at a great rate, morphine was stable due to minimum postmortem redistribution and a reliable metabolite for postmortem toxicology, vitreous humour was affected by immersion and results in less reliable, bile specimens could be valuable for postmortem toxicology in heroin fatality cases without being influenced by environment and postmortem interval changes.

**Keywords:** Postmortem redistribution, Heroin, Morphine, 6-monoacetyl-morphine, Morphine-3-beta-glucuronide

**PRIMARY ENDOCARDIAL FIBROELASTOSIS: A CASE REPORT**

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Endocardial fibroelastosis (EFE) is rare fetal cardiac malformation, characterized by thickening of the endocardium by collagen and elastic fibers.

The patient was a pregnant 28-year-old woman (gravid 1) in prenatal care with negative standard serological tests (toxoplasmosis, rubella, syphilis, HIV). All routine obstetric ultrasound examinations were normal. The pregnancy was terminated at 40-weeks gestation during spontaneous vaginal delivery. A patient gave birth to a male newborn presented with a severe heart failure that died within 2 days of birth.

On pathological examination, fetus weighed 3870 g and was 54 cm in length. Macroscopically, the heart was enlarged, 6.6x6 cm in diameter. Both ventricles were dilated, spherical shaped, with stressed diffuse, concentric hypertrophy and diffusely thickened endocardium. The papillary muscles were displaced upward, while the free edges of the mitral valve leaflets were thicken.

Histological examination showed a fibrous thickening of the endocardium, not only of the left, but also the right ventricle. Thick, oriented aortic-like colagenous and elastic bands were admixed between miocytes.

EFE should be recognized to promote ant introduce routine early diagnostic protocols that could help in better understanding of the natural history and etiology of EFE.

**KEYWORDS:** forensic pathology; fetal endocardial fibroelastosis; cardiomegaly; cardiomyopathy
THE ROLE OF ALCOHOL
IN FATAL ROAD TRAFFIC ACCIDENTS IN CITY OF KRAGUJEVAC

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Alcohol is one of the major human factors, responsible for underlying fatal roadtraffic accidents (RTA). The aim of this study was to examine bloodalcohol concentrations (BAC) in different roadusers according to epidemiological variables.

This is an epidemiological, analytical, retrospective and cross-sectional autopsy study which included 377 RTA subjects who died from sustained injuries in the territory of Kragujevac during the 2001-2016 periods. BAC was measured for all subjects who died at the scene of accidents, and subjects who outliving injures longer than 24 hours were excluded from this study.

Positive BAC was registered in 124 (32.9%) subjects RTA with mean BAC 1.41±0.88‰. At 21 (16.9%) subjects BAC were smaller than 0.50‰, while at 103 (83.1%) BAC was higher than 0.51‰. In the study sample, men were 116 (93.5%) with mean BAC 1.46±0.88‰ and 8 (6.5%) women with mean BAC 0.77±0.36‰ whereas the number of men subjects were significantly higher ($\chi^2=94.065; df=1; p=0.000$) and mean BAC of males was significantly higher than the mean BAC of females($t$ test=4.513; $p=0.001$). According to the age group the highest number of subjects with a positive BAC were in ages group 15-35 years (45, i.e. 36.3%), than 51-65 years (34, i.e. 27.4%), 36-50 years (31, i.e. 25%), and the smallest number was in ages group older than 65 years (14, i.e. 11.3%). Among all the different categories of subjects, it can be seen that most subjects with positive BAC was in group motor vehicle drivers (39, i.e. 39.8%) with mean BAC 1.35±0.74‰ and motorcyclists (13, i.e. 39.4%) with mean BAC 1.28±0.63‰. Distribution of the other participants was as follows: pedestrians (37, i.e. 16.8%) with mean BAC 1.37±0.99‰; front-seat passengers (15, i.e. 19%) with mean BAC 1.57±0.85‰; back-seat passengers (7, i.e. 24.1%) with mean BAC 2.11±1.07‰; tractor drivers (5, i.e. 29.2%) with mean BAC 0.96±0.61‰ and bicyclists (4, i.e. 10.5%) with mean BAC 1.52±1.61 ‰.

Despite so far known facts about the harmful effects of alcohol in road accidents, our study shows that every third subject who was died in the RTA was under the influence of alcohol.

Keywords: autopsy, blood alcohol concentration, road traffic accidents.
TOXIC SUBSTANCES AS A CAUSE OF BOLUS DEATH-CASE REPORT

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Respiration and swallowing are related and coordinated to safe transit of food through the pharynx. The loss of respiration-swallowing coordination may cause dysphagia, aspiration, pneumonia, dehydration and death. According to the author's own investigations bolus deaths and numerous accidental deaths by drowning occur in adults and adolescents under impact of toxic substances. The aim of the study was made to elucidate the mechanism by which alcohol, methadone and benzodiazepines as a toxic substances, play their role in bolus death. In January, 2019 in one city in central part of R.of N.Macedonia, a deceased men (37 years old) was found in front of his apartment. Because of the unknown cause of death, investigative authorities had requested a forensic autopsy to be performed. During the autopsy, external examination showed excoriations in the area of: the right side of the forehead, area of the nose, area of the right zygomatic bone, area of the right lobule of the ear, area of the right shoulder and the right little finger. A hematoma was found in the area of the left upper eyelid and on the top of the fourth and fifth finger of the left hand. Oval shaped scars were found in the right groin area. Poor dentition was registered as well. At the internal findings in the area of hypopharyngs, a cap that resembled of pickled cabbage leaves, firm in consistency, yellowish brown in color, with dimensions of 8x4cm which closed laryngeal aditus, was found. The area where the cap was found was hyperemic, while the rest of the esophagus was with normal colour. Ecchymosis (scattered plaques) were found subpleural and in gastric mucosa. The rest of the organs were in normal conditions. Laboratory analysis of blood showed 2,31% alcohol and 2,86% alcohol in urine. Methadone was detected in urine (>1000ng/ml, cut-off 300ng/ml), and benzodiazepines as well (>1000ng/ml,cut–off  200ng/ml).

According to the study literature, on account of considerable interference of alcohol, methadone and benzodiazepines with vegetative activity, via action on transmitter metabolism (transmitter synthesis, storage, release, rebonding and bonding by means of products of their metabolism), symptoms of extreme vagotomia may develop, such as bradycardia with circulatory centralisation and apnoea of alcohol-related irreversibility, finally resulting in cardiac arrest.

This study pointed out that poor dentition and impairment of the swallowing reflex, as a consequence of alcohol, methadone and benzodiazepines abuse, are important risk factors for bolus death.

Keywords: toxic substances; bolus death; autopsy.
TWO CASES OF FATAL INTOXICATIONS INVOLVING FLUORO-ANALOGUES OF FENTANYL

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Fentanyl, powerful synthetic opioid and its analogues (especially designer drugs) are great risk to public health and as such present challenges for analytical chemists. Several fentanyl analogues are far more potent than morphine. Therapeutic concentrations of fentanyl (0.0003 - 0.01mg/L) overlap with lethal concentrations (0.003 - 0.21mg/L). In 2019 The European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) scheduled 57 fentanyl analogues. In United States of America fentanyls are the main cause of overdose deaths.

We present two cases of fatal intoxications that involved fluorinated fentanyl analogues: 2-fluoro methoxyacetyl fentanyl (ocfentanyl) and fluorofentanyl (isomer was not determined).

The common feature about both cases was combined drug intoxication with preliminary results that didn’t give satisfactory explanations of cause of death. In the first case toxicologist asked for additional information of drugs found at the apartment where deceased lived. Enhanced liquid-liquid extraction followed by gas chromatographic-mass spectrometric analysis in selected ion monitoring mode using World Anti-Doping Agency criteria gave decent electron impact spectral match to confirm presence of fluorofentanyl in urine. Due to the lack of certified reference materials the type of isomer and amount were not determined. In the second case expanded library search gave positive identification of fluoro methoxyacetyl fentanyl in blood and urine. The isomer was identified, and its concentration estimated.

Low concentrations of illicit fentanyl analogues in body fluids and their diversity pose great challenge in their detection. Additional anamnestic information from the scene greatly enhances the probability for identification of designer fentanyls. Access to expensive certified reference materials (different isomers of fentanyl analogues can have the same mass spectrum but differ in chromatographic properties) is additional burden for toxicological laboratories and the cause of lags in solving the cases.

Keywords: Fluorofentanyl analogues; Designer drugs; Fatal intoxication; GC-MS
VITREOUS HUMOUR AS AN ALTERNATIVE MATERIAL FOR THE DETERMINATION OF THE BLOOD ALCOHOL CONTENT (BAC) IN THE POSTMORTEM TOXICOLOGICAL ANALYSES

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In medico-legal practice there are cases of extreme exsanguination, usually affecting victims of traffic accidents, but also suicides. In such situations vitreous humour (VH) can be a very useful material for toxicological analysis.

The aim of our study was to assess the suitability of vitreous humour for determining the blood ethanol concentration in deceased bodies. The study presents a correlation between the content of ethyl alcohol in vitreous humour and the concentration of ethyl alcohol in femoral blood (FB). The analyzed material consisted of blood and vitreous humour samples taken from 103 individuals who died in the period 2012-2017 and whose postmortem examinations were carried out at the Department of Forensic Medicine, Medical University of Bialystok. Blood alcohol content (BAC) was determined using the method of gas chromatography (GC). The results were analyzed statistically with MF Excel and Statistica 12.5. Statistical analysis did not reveal significant differences between the concentration of ethanol in VH and FB. Spearman’s correlation between the concentration of ethanol in the materials under study was \( r = 0.94, \ p < 0.01 \). The study demonstrated no statistically significant differences between the concentration of alcohol in VH and in FB. Consequently, vitreous humour can be used as a reliable alternative material in cases where there is no possibility of collecting femoral blood for toxicological tests.

Keywords: extreme exsanguination, vitreous humour, femoral blood, blood alcohol content
ASSAULT OR ATTEMPTED HOMICIDE: A PREDICTION SCORE BASED ON A RETROSPECTIVE STUDY.

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Background: Unravelling between assault and attempted murder represents an important challenge in legal medicine routine. According to Italian legislation the difference between them should be related to the perpetrator’s animus: necandi in case of homicidal intentions and laedendi for harmful ones. The aim of this work is to build up a prediction score able to predict the type of crime based on the reported physical damage.

Materials and Method: A scale was created according to injury origin (blunt and sharp force injury, gunshot wounds) and their exact bodily localization (head, chest, abdomen, upper and lower limbs, groin). Arbitrary coefficients were then assigned depending on the specific injury. We identified 61 forensics cases (n°21 autopsies and n°40 physical examination on living individuals) assigning each a specific score. Significant statistical differences between the two groups were identified with T Student Test (p< 0.001 and p<0.005).

Results: In the following table are reported the proposed score threshold values:

<table>
<thead>
<tr>
<th>Wound type</th>
<th>Mortality (%)</th>
<th>100%</th>
<th>50%</th>
<th>0%</th>
<th>other</th>
</tr>
</thead>
<tbody>
<tr>
<td>firearms</td>
<td>&gt;1500</td>
<td>1500-750</td>
<td>&lt;750</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>blunt</td>
<td>&gt;240</td>
<td>-</td>
<td>&lt;120</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>sharp</td>
<td>&gt;2400</td>
<td>2400-1000</td>
<td>-</td>
<td>1000-375 → 22%</td>
<td>&lt;375 → 8.3%</td>
</tr>
</tbody>
</table>

Discussion: In case of firearms, despite a significant statistical difference (p<0.001) our data shown that the homicidal intent may be excluded for injuries localized in the limbs and at close discharges.

Regarding blunt force our score clearly identifies the animus according to anatomical site, weapon type and number of wounds inflicted.

Melee weapons deserve a special mention. The statistical analysis shows less sensibility (p<0.005) in discriminate between lethal and non-lethal injuries. Death rarely occurs for head injuries in case of stab and incised wounds while is very common in chop wounds. Melee weapons may be lethal in case of limbs wounds whenever a major blood vessel is involved.

As expected, neck, thoracic and abdominal penetrating wounds appear to be strictly related to homicidal intent, while, in case of thoracic and abdominal non-penetrating wounds, the animus may not always be objectively evaluated by the pathologist leaving the decision to the judge.

Keywords: Interpersonal violence, weapons, homicide, assault, arbitrary score.
FEMICIDE-SUICIDE IN INTIMATE PARTNER VIOLENCE – A 15-YEAR FORENSIC CASE REVIEW

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Femicide committed by a current or former marital or extramarital partner or boyfriend is known as intimate femicide or intimate partner homicide. The authors investigated cases of homicide-suicide (HS) in context of intimate femicide in Southeast Serbia by analyzing the records of the Institute of Forensic Medicine Niš in the 2000-2014 period. According to the results of this study, 36.50% cases of all femicides (n = 74) were followed by a suicide (74.07%) or attempted suicide (25.93%) of perpetrators. All the perpetrators were male with the mean age of 51, 78 years (min = 28; max = 81; SD = 14.60), mostly married to the victim (66.66%). The suicidal act was most often performed/attempt immediately after the femicide (82.50%). Firearms were used in most cases, to both homicide and suicide (92.59%) and were followed by homicide (48.14%) or by attempting to kill (22.22%) other individuals, predominantly children and victim's family members. The aim of this 15-year retrospective study is to provide a better understanding of the HS phenomena in intimate femicide from medico-legal aspect, since forensic medicine have an important role in designing appropriate programs and strategies to prevent this type of violence.

Keywords: Intimate Partner Violence; Femicide; Homicide-Suicide;

ADDITIONAL HISTOCHEMICAL AND IMMUNOHISTOCHEMICAL METHODS IN FORENSIC DIAGNOSTICS OF SUDDEN CARDIAC DEATHS

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Sudden cardiac death is defined as a natural, unexpected fatal event due to cardiac causes that occurs within 1 hour from the onset of acute symptoms in an apparently healthy subjects or ones with known cardiac disease without severe enough symptoms to predict such an abrupt outcome. In some cases, especially in young people, beside the common causes of sudden cardiac death, we are unable to determine cause of death due to clinical picture and nonspecific autopsy findings. In these cases, we need to implement additional histochemical and immunohistochemical methods.

We report a case of 23 year old female without history of previous cardiac disease, who died within an hour after hospital admission. The autopsy findings were unspecific: well-pronounced death spots, blood stasis in the internal organs, cerebral and pulmonary edema, and nonspecific macroscopic findings on the heart. Autopsy and toxicological analysis exclude violent causes of death. Hematoxylin and eosin staining of the heart muscle indicated hypertrophy, but that was insufficient to conclude the cause of death. On Dystrophin C and Desmin staining necrotic myocardial fibers were not discovered. Accentuated fibrous fibers are also observed between heart
fibers and perivascular on Van Geason elastica staining. A large number of lipofuscin granules in myocytes were observed on Sudan-stained preparations, and PAS positive glycoprotein granules were found. The presence of mast cells (PAS and Toluidine staining) is significant. Immunohistochemical and histochemical staining revealed less pronounced diffuse inflammatory infiltrate in all myocardial samples with dominance of T lymphocytes (CD8+, CD3+, CD4+) and CD 117+ macrophages. Caveolin and CD 31 staining did not indicate a decrease in vascular weft. Perinuclear enlightenment was established by Tropomyosin, Troponin I and Troponin T staining. In the lung sample, in addition to edema and blood stasis, hemosiderophages were also found.

The presence of a predominantly T lymphocyte infiltrate speaks in favor of the initiated immune inflammatory mechanisms, probably caused by a viral etiological factor. The histopathological findings of additional cardiac muscle staining indicate developing of hypertrophic cardiomyopathy, and aging of heart muscle that does not correlate with person’s age. It indicates that a sudden cardiac death occurred as a consequence of diffuse chronic changes in the heart muscle. These methods may represent key factors for determining sudden cardiac deaths in forensic diagnostics.

**Keywords:** Sudden cardiac death; Autopsy; Cardiac muscle staining; Hypertrophic cardiomyopathy

INTOXICATION CAUSED BY NEW PSYCHOACTIVE SUBSTANCES (NPS) IN HUNGARY – CLINICAL EXPERIENCES

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The new psychoactive substances (stimulant designer drugs and synthetic cannabinoids) represent about 40% of seized materials. This study aimed to investigate the frequency of designer drugs among hospitalized intoxicated cases and to find relation between their concentrations in the blood and clinical symptoms.

**Materials and methods** At the Department of Emergency Care and Clinical Toxicology of Péterfy S. Hospital (Budapest) 115 patients were suspected to be intoxicated by illicit and/or designer drugs between 04/2018 and 02/2019. At admittance their physical, neurological, and psychological status was recorded. Blood samples for toxicological analysis were taken at arrival and 1, 3 and 5 hours later.

**Results** 77 patients of the 115 investigated was positive for classical illicit drugs, stimulant designer drugs, synthetic cannabinoids or medicines; 10 of them was also positive for alcohol. Only alcohol was found in further 17 persons, and 21 patients were negative for all tested substances.

Stimulant designer drugs were detected in 7 cases (4-CMC – 1, N-ethyl-hexedrone - 6). 5F-MDMB-PINACA and 5F-MDMB-PICA were detected in 23-23 cases.

The blood concentration of designer drugs were: 4-CMC (117 ng/ml), N-ethyl-hexedrone: (41.8-138 ng/ml, median: 129 ng/ml), 5F-MDMB-PINACA (0.088-2.54 ng/ml, median: 0.25 ng/ml), 5F-MDMB- PICA (0.024-3.54 ng/ml, median: 1.11).

**Main symptoms:**
One patient who abused 4-CMC climbed onto a pylon. When the ambulance arrived he was confused and redundant, pronounced psychomotor agitation, increased RR and pulse, hyperemic conjunctiva, wide pupils, and hyperactive reflexes were observed. N-ethyl-hexedrone (41.8-595 ng/ml) was detected in 6 persons with the main symptoms of confusion, agitation, and aggressive behavior. Hallucination, high RR, tachycardia, elevated body temperature (38.9 °C), hyperemic conjunctiva, slow pupillary light reaction were also observed.

Most of synthetic cannabinoid users were unconscious or confused when the ambulance arrived. Some of them were agitated, hallucination, aggressive behavior, ataxia, increased blood pressure and vegetative symptoms were also registered. During observation, or in some cases treatment, their reaction was slow, slurred speech and disorientation were also observed.

Due to the low number of cases exact connection between serum concentrations and clinical symptoms couldn’t be determined as only the main symptoms characteristic for a substance group were common in the patients.

**Key words:** designer drug, intoxication, clinical symptoms

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**APPLICATION OF OPTICAL COHERENCE TOMOGRAPHY IN FORENSIC PATHOLOGY AND CLINICAL LEGAL MEDICINE RESEARCH: THE CURRENT STATE OF THE ART.**

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**Introduction:** Optical Coherence Tomography (OCT) is an informetric imaging technique spread since the last decade of 20th century. The main feature of the devices based on this technique is the possibility to obtain three-dimensional, non-contact, and non-invasive analysis of the studied tissue in real-time. The aim of this work is to describe principal advances of the forensic pathology in OCT-based research.

**Material and Methods:** manuscripts from 2000 to 2019 are searched on PUBMED, MEDLINE and SCOPUS using combinations of words ‘OCT+Forensic’, ‘OCT+Pathology’, ‘OCT+postmortem’, ‘OCT+autopsy’. Research allowed us to find 30610 works. Only works of forensic pathology interest have been considered for the current manuscript.

**Results and Discussion:** the current study showed that OCT is actually applied in few branches of Forensic and Legal Medicine which in particular: coronary arteries study for defining cardiac death, detection of postmortem ocular changes with tanatochronodiagnostic aims, as alternative to histology in some fields of pathology, to study ocular signs of child abuse. In forensic pathology research, similarly to *in vivo* studies it is applied to endoscopic devices for the definition of deaths due to coronaropathy. Microscopic images are obtained by use of OCT system without any
alteration of vascular and cardiac tissue. This is an advantage compared with conventional autopsy. In forensic ophthalmology, OCT is used both in postmortem and in vivo analysis. In postmortem our group is studying respectively corneal changes after death to define postmortem interval (PMI) and other ocular structures changes to explain particular death cases. Other groups studied retinal tissue in postmortem by means of OCT device associated with periscope: indeed, due to cornea and lens clouding, in intermediate PMI hours non-invasive observation of the posterior chamber is impossible. Different studies in field of gynecology and gastroenterology analyzed comparatively tissues with OCT and traditional histology with interesting results. Other groups more studied in vivo using the device respectively abuse correlated ocular changes in children and trauma correlated retinal changes in adults. Other groups studied postmortem meningeal alteration related to children abuse.

**Conclusion:** OCT based devices have important features to allow a non-invasive, non-contact, tridimensional, cross-sectional analysis of examined substrate. Since “virtual autopsy” and “virtual histology” are both future challenges of forensic pathology it is desirable that more OCT-based studies be conducted in the coming years.
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