

E070

2-hour Educational Workshop

Forensic microbiology - current and future challenges

Poisonous spaghetti? Public-health concern of forensic microbiology and pathology

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The autopsy is the forensic golden standard in determining the cause and manner of death. Undoubtedly ancillary investigations, i.e. post mortem (pm) imaging, histology, toxicology, biochemistry, genetics and, indeed, microbiology may be very important in the diagnosis of sudden or unexpected death, e.g. (viral) myocarditis, long QT-syndrome, intoxication, hypo- and hyperglycemic coma, air and fat embolism etc. Adequate sampling is mandatory as advised by international standards[1].

PM microbiology is still controversial because of difficulties in interpretation inherent to decay or putrefaction, being a bacterial process. False positive post mortem results due to pm invasion, translocation and contamination from oropharyngeal and gastro-intestinal colonized mucosa and/or to inadequate sampling during autopsy, challenge the forensic pathologist. Forensic pathologists feel uncomfortable about bacteriology and clinical microbiologists have no experience with pm examinations.

Nevertheless, a few sudden or unexpected death cases can not be resolved without microbiology, especially those related to fulminating septicemia (without detectable infectious primary locus; Clostridium septicemia in cases of accelerated putrefaction) and food poisoning by toxin producing bacteria. The latter may be a major concern of Public Health but also be a problem of interpretation as illustrated in the next three cases.

A 6-year old girl (ON/03-281) died within 3 hours of admission at the hospital, in a state of coma and tetany. She and 5 other children became sick with vomiting and diarrhea after eating cold pasta, prepared 3 days before and kept in a refrigerator at 14 °C. The survivors developed liver failure, metabolic acidosis, hypoglycemia and coagulopathy but fortunately recovered. Bacillus cereus was identified in the pasta and in spleen and faeces of the dead.

A 3-year old boy (FG 002964) was found dead in his bed 5 hours after vomiting at night. A petechial rash prompted autopsy but did not reveal bacterial meningitis. The same day, his 8 month old brother became ill with minor symptoms. Food was examined but only pm haemoculture and a swab of screw cap of an empty water bottle were positive for enterotoxin producing Bacillus cereus. The cause of death was signed out as Bacillus cereus (food) poisoning, emetic type.

A 13-y old boy (FG 006840) died shortly after he became unconscious and cyanotic at home. The forensic autopsy showed petechial rash, accelerated decomposition and massive intestinal hemorrhage. Faeces and gastric content were positive for Bacillus cereus. Toxicology however revealed high amounts of arsenicum in blood!

Therefore, optimisation and standardisation of pm microbiology is needed[2].

[1] Recommendation No R (99) 3 of the Council of Europe on the harmonisation of medico-legal autopsy rules. Forensic Science International, 2000; 111: 5-29

[2] Fernandez-Rodriguez A., Cohen M.C., Lucena J., Van de Voorde W. et al. European Journal of Clinical Microbiology and Infectious Disease, DOI 10.1007/s10096-015-2317-x