Forensic Pathology & Clinical Forensic Medicine

MACKLIN EFFECT IN HANGINGS ON POST MORTEM CT

Joanne C. Y. Ho, Chris O'Donnell

Victorian Institute of Forensic Medicine, Southbank, Vic, Australia

Hanging is the suspension of a person by a noose or ligature around the neck and is not an uncommon occurrence in everyday forensic work. With the evolving use of post mortem CT scans as an adjunct to post mortem examinations, there has been increasing speculation around the 'Macklin effect' and whether they occur more commonly in full or partial suspensions. The proposed Macklin effect results from rupture of terminal alveoli causing elevated intra-thoracic pressure with subsequent dissection of air into the mediastinal and cervical soft tissues and appears as air collections on the post mortem scan.

A review of over 100 neck compression/hanging cases at VIFM was conducted to determine the frequency and reliability of the Macklin effect in hangings.

CAN DENTAL CHARTING FROM A POST-MORTEM COMPUTED TOMOGRAPHICAL SCAN PRODUCE A CONFIDENT FORENSIC IDENTIFICATION WITHOUT TRADITIONAL PHYSICAL AND RADIOGRAPHIC EXAMINATION

Selina Leow¹, Denise Higgins¹, Alain Middleton²

¹*University of Adelaide, SA, Australia; and* ²*Department of Forensic Medicine, Forensic Medicine and Coroner's Court Complex, Lidcombe, NSW, Australia*

Dental comparison is internationally accepted as one of the primary scientific methods of identification of a deceased person or persons. With advances in modern technology the use of post-mortem computed tomography to aid forensic medicine and forensic odontology is on the increase. In this study we explore if odontologists with varying levels of experience in forensic odontology, and more specifically with charting from a multi-planar reformation, can extrapolate data of equivalent value from computer tomographic images as traditional radiographs. We also assess their confidence in their ability to formulate a valid opinion from this data alone. Australian odontologists were asked to complete a questionnaire which required dental charting from a variety of radiographic images and explored the practitioner's confidence in the records produced. Experience level had very little impact upon the confidence of charting from computed tomography images alone, especially in the presence of metallic restorations; however, the results of the survey indicate that currently practitioners are not confident in charting from a multi-planar reformation alone and that traditional physical and radiographic examinations are still indicated.

AN OVERVIEW OF ARTIFICIAL INTELLIGENCE/ DEEP LEARNING

Jack Garland¹, Mindy Hu², Kilak Kesha², Charley Glenn², Michael Duffy², Paul Morrow², Simon Stables², Benjamin Ondruschka³, Ugo Da Broi⁴, Rexson Tse^{2,5}

¹*Forensic Medicine and Coroners Court Complex, Lidcombe, NSW, Australia;* ²*Northern Forensic Pathology Service of New Zealand, Auckland, New Zealand;* ³*Institute of Legal Medicine, University Medical Center Hamburg-Eppendorf, Hamburg, Germany;* ⁴*Department of Medicine, Section of Forensic Medicine, University of Udine, Udine, Italy;* and ⁵*Faculty of Medical and Health Sciences, University of Auckland, Auckland, New Zealand*

Artificial intelligence (AI) technologies have had increasing use in numerous medical and non-medical applications. Deep learning AI in particular is no longer a matter for research only and has been used in clinical practice applications in radiology and histopathology for years. Whilst radiology, photography and histopathology are large components of modern forensic pathology practice, AI image analysis and recognition technologies have not been used in forensic pathology to the same extent as they have in other medical specialties. This talk aims to provide an introductory explanation of AI and deep learning technologies. Additionally, this talk will discuss published research by the presenters on applications of deep learning technology to post mortem radiology, post mortem histology and macroscopic organ photographs, all conducted using freely available open-source software.

POTENTIAL FOR MINIMALLY INVASIVE RADIOLOGIC PROCEDURES IN CASES OF CULTURAL AND/OR FAMILY OBJECTION TO AUTOPSY

Andrew Gilkison

Radiology Department, Christchurch Hospital, Christchurch, New Zealand

It is considered conventional wisdom that 3-cavity post-mortem examination (+/- toxicology and postmortem CT) gives the most information in death investigation. However, coroners in New Zealand (and at least parts of Australia) have increasingly been required to take into account the wishes of next of kin regarding any objections to autopsies. Various groups, including indigenous populations, may be opposed to autopsy due to cultural, religious, or personal beliefs; and in such cases the coroner may direct a lesser post-mortem limited to external examination of the body.

Clinical radiology regularly utilises many image-guided, minimally invasive techniques for diagnostic or therapeutic purposes. This presentation looks at the potential of some of these techniques for cases where there is objection to full autopsy and a lesser post-mortem has been directed. Examples

include obtaining samples for toxicology, biopsy of lesions, minimally invasive vascular access, and contrast enhanced imaging studies.

THE FORMATION OF A CARDIAC ARREST REGISTRY IN AUSTRALIA [END UNEXPLAINED CARDIAC DEATH (EndUCP) REGISTRY]

Sarah Parsons^{1,2}, Elizabeth D. Paratz^{3,4,5}, Alexander van Heusden³, Dominica Zentner^{6,7}, Natalie Morgan¹, Tina Thompson⁶, Paul James⁶, Andreas Pflaumer^{8,9,10}, Christopher Semsarian¹¹, Jodie Ingles^{12,13,14}, Rosalind Case^{3,4,15,16,17}, Jocasta Ball^{3,16,18}, Karen Smith^{16,18}, Dion Stub^{3,4,15,16}, Andre La Gerche^{3,4,5}, for the Australian EndUCD Registry
¹Victorian Institute of Forensic Medicine, Melbourne, Vic, Australia; ²Department of Forensic Medicine, Monash University, Melbourne, Vic, Australia; ³Baker Heart and Diabetes Institute, Melbourne, Vic, Australia; ⁴Alfred Hospital, Melbourne, Vic, Australia; ⁵St Vincent's Hospital Melbourne, Melbourne, Vic, Australia; ⁶Royal Melbourne Hospital, Melbourne, Vic, Australia; ⁷Royal Melbourne Hospital Clinical School, Faculty of Medicine, Dentistry and Health Sciences, University of Melbourne, Melbourne, Vic, Australia; ⁸Royal Children's Hospital, Melbourne, Vic, Australia; ⁹Department of Paediatrics, Melbourne University, Melbourne, Vic, Australia; ¹⁰Murdoch Children's Research Institute, Royal Children's Hospital, Melbourne, Vic, Australia; ¹¹Agnes Ginges Centre for Molecular Cardiology at Centenary Institute, The University of Sydney, Sydney, NSW, Australia; ¹²Cardio Genomics Program at Centenary Institute, The University of Sydney, Sydney, NSW, Australia; ¹³Department of Cardiology, Royal Prince Alfred Hospital, Sydney, NSW, Australia; ¹⁴Faculty of Medicine and Health, The University of Sydney, Sydney, NSW, Australia; ¹⁵Department of Epidemiology and Preventive Medicine, Monash University, Melbourne, Vic, Australia; ¹⁶Ambulance Victoria, Melbourne, Vic, Australia; ¹⁷Florey Institute of Neuroscience and Mental Health, Melbourne, Vic, Australia; and ¹⁸Department of Community Emergency Health and Paramedic Practice, Monash University, Melbourne, Vic, Australia

The End Unexplained Cardiac Death (EndUCD) Registry commenced in Victoria, Australia in April 2019. It is a multicentre cardiac arrest surveillance registry for patients aged 1 to 50 years. It is intended to expand into NSW and then other states of Australia. The key aims of the EndUCD Registry are to:

- 1) Provide a patient support resource, including website, patient-oriented information and streamlined referral process.
- 2) Create a research platform for advocacy and improving understanding of accurate rates of sudden cardiac arrest/ death in patients aged 1–50 years old.
- 3) Create a genetic biorepository as a resource for future studies.
- 4) Provide a state-of-the-art resource for clinicians wishing to link cardiac arrest patients and families in with psychological support, comprehensive family screening and consideration of genetic testing.

This presentation will examine the initial formation of the registry and present initial data from the first 2 years of collection and examine the role of forensic pathologist and forensic services in such a registry.

BACKGROUND, TESTING METHODS, AND LABORATORY APPROACHES TO SARS CORONAVIRUS-2 (SARS-CoV-2) AND COVID19

William D. Rawlinson^{1,2}, Sebastiaan van Hal³, Malinna Yeang¹, Anna Condylis¹, Zin Naing¹, Jane-Phan Au^{1,2}, Mariana Ruiz da Silva^{1,2}, Charles Foster^{1,2}

¹Serology and Virology Division, NSW Health Pathology Microbiology, SEALS Prince of Wales Hospital, NSW, Australia; ²Schools of Women's and Children's Health, Medicine and Biotechnology and Biomolecular Sciences, University of New South Wales, Sydney, NSW, Australia; and ³Department of Microbiology and Infectious Diseases, NSW Health Pathology, Royal Prince Alfred Hospital, NSW, Australia

Introduction: A pandemic is an epidemic occurring worldwide, crossing international boundaries and affecting many people. The spread of SARS-CoV-2 from Hubei province in China globally has led to rapid changes in our approaches to diagnosis, with rapid use of molecular methods such as whole genome sequencing (WGS) to characterise mutations, and deployment of novel therapeutics including mRNA vaccines and monoclonal antibodies.

Methods: New methods for diagnosis, including WGS, and different approaches to emerging mutations in virus variants of concern (VOC) will be discussed.

Results and conclusions: Diagnosis now uses standard molecular methods including commercial and inhouse techniques, more recently rapid antigen detection, and research into rapid smartphone based nanoparticle assays. Laboratory practices of sample pooling, reflex testing using WGS, and workflow changes are now routine.

The use of rapid WGS techniques,¹ and available Australian data,^{2,3} have informed assessment of the accuracy and utility of these methods in the diagnostic laboratory. Assessment of changes in PCR primer binding sites, and of the influence of how sequence data are assessed (Foster *et al.*, in press) means accreditation and QA programs need to be continuously updated.

References

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2. Rockett RJ, Arnott A, Lam C, *et al.* Revealing COVID-19 transmission in Australia by SARS-CoV-2 genome sequencing and agent-based modeling. *Nat Med* 2020; 26: 1398–404.
3. Seemann T, Lane CR, Sherry NL, *et al.* Tracking the COVID-19 pandemic in Australia using genomics. *Nat Commun* 2020; 11: 4376.

CORONAL CASES: SARS-CoV-2 INFECTION AND COVID-19

Linda Iles

Victorian Institute of Forensic Medicine, Melbourne, Vic, Australia

Victoria's second wave of SARS-CoV-2 infections saw a number of reports of deaths of SARS-CoV-2 positive persons made to the coroner. Whilst COVID-19 deaths are natural and do not routinely fall under the coroner's jurisdiction, these cases were brought to the coroner's attention due to deaths