Introduction to Post-Mortem Imaging

RCPA Update 2019
Dr Thomas Ruder
Clinical Director Radiology
Background

Source/Figure:  (Bern) commons.wikimedia.org
Post mortem imaging 1900

Source/Figure: Brogdon BG, Forensic Radiology (1st ed 1998)
Post mortem imaging 2015

Source/Figure: IRM Zurich, Switzerland
Quantum leap: CT & MR

Benefits of imaging

- Non-invasive
- Observer independent
- Second opinion
- Visualization
- Permanent storage

Source/Figure: (1) IRM Zurich, Switzerland; (2) Ruder T. BJR 2014
Non-contrast PMCT

Key: bone – stone – gas – mass

Fractures

Foreign bodies

Source/Figure: IRM Zurich, Switzerland
Non-contrast PMCT

Key: bone – stone – gas – mass

Gas accumulation

Fluids/mass effect

Source/Figure: IRM Zurich, Switzerland
PMCT angiography

Key: leak > occlusion; caveat: pressure

Source/Figure: (1) Ruder TD, Leg Med (2010); (2) Ross A, Radiology (2012); IRM Zurich, Switzerland
PMMR imaging

Key: fluid accumulation

Source/Figure: (1) Ruder TD, BJR (2013); (2) Ross S, AJR (2012); (3) IRM Bern, Switzerland
PMMR angiography

Key: soft tissue detail and leak

Source/Figure: (1) Ruder TD, JFS (2011); (2) Laberke P, JoFRI (2017)
Role of modalities

Source/Figure: (1) IRM Zurich, Switzerland; (2) Ross A, AJR (2008); (3) Ruder T, BJR (2013); (4) Laberke P, JoFRI (2017)
ISFRI 2019 | MAY 16TH – 18TH IN BERLIN

Willkommen! And Bienvenue! Welcome! This is one of the most famous phrases from the musical “Cabaret” inviting you to Berlin at the beginning of the 20th century. In my role as convenor of the ISFRI 2019, I am pleased to address these words to you at the beginning of the 21st century. I am cordially inviting you to the combined 8th annual meeting of the International Society of Forensic Radiology and Imaging and the 14th annual meeting of the International Association of Forensic Radiographers in Berlin, Germany from May 16th – 18th 2019.

Continue reading | Registration now open!

www.isfri2019.de
Role of imaging

- Area & population
- Local traditions & law
- Access to scanners
- Availability of experts
- Case load
- Financial resources
## Comparison of conditions

<table>
<thead>
<tr>
<th>Zurich (CH)</th>
<th>Δ</th>
<th>Northland (NZ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area</td>
<td>7'000 km²</td>
<td>&lt;2x</td>
</tr>
<tr>
<td>Population</td>
<td>2'430'000</td>
<td>&gt;15x</td>
</tr>
<tr>
<td>Autopsy accepted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Law forensic/CT</td>
<td>≈</td>
<td>coronial/CT</td>
</tr>
<tr>
<td>CT access</td>
<td>exclusive</td>
<td>&gt;</td>
</tr>
<tr>
<td>Experts</td>
<td>+++</td>
<td></td>
</tr>
<tr>
<td>Cases</td>
<td>1'200</td>
<td>&gt;8x</td>
</tr>
<tr>
<td>Finances</td>
<td>$$</td>
<td>&gt;</td>
</tr>
</tbody>
</table>
## Comparison of conditions

<table>
<thead>
<tr>
<th></th>
<th>Zurich (CH)</th>
<th>∆</th>
<th>Northland (NZ)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Area</strong></td>
<td>7’000 km²</td>
<td>&lt;2x</td>
<td>14’000 km²</td>
</tr>
<tr>
<td><strong>Population</strong></td>
<td>2’430’000</td>
<td>&gt;15x</td>
<td>170’000</td>
</tr>
<tr>
<td><strong>Autopsy</strong></td>
<td>accepted</td>
<td>&gt;</td>
<td>Māori: object</td>
</tr>
<tr>
<td><strong>Law</strong></td>
<td>forensic/CT</td>
<td>≈</td>
<td>coronial/CT</td>
</tr>
<tr>
<td><strong>CT access</strong></td>
<td>exclusive</td>
<td>&gt;</td>
<td>shared</td>
</tr>
<tr>
<td><strong>Experts</strong></td>
<td>+++</td>
<td>&gt;</td>
<td>(+)</td>
</tr>
<tr>
<td><strong>Cases</strong></td>
<td>1’200</td>
<td>&gt;8x</td>
<td>150</td>
</tr>
<tr>
<td><strong>Finances</strong></td>
<td>$$$</td>
<td>&gt;</td>
<td>$</td>
</tr>
</tbody>
</table>
Comparison: role of imaging

Zurich:
- Death: 1200
- External Imaging: 800
- Autopsy: 500
- Release: 500

Northland:
- Death: 150
- External Imaging: 100
- Autopsy: 85
- Release: 20
  - Green light
  - Red light
Comparison: role of imaging

Zurich: Death, 1200
Northland: Death, 150

Conditions: pre-scan role

Case: post-scan role

Release
Release
Post-scan role of imaging

Cause of death

Classification of certainty
1. Positive, inconsistent with life
2. Positive, explain death
3. Marginal, but history & exclusion
4. Negative, but history & exclusion
5. Negative, undetermined

Source/Figure: Hanzlik R et al. A Guide For Manner of Death Classification, NAME (2002), Appendix
Post-scan role of imaging

Cause of death + manner of death

Bleed

Natural

Accident

Suicide

Homicide

Unclear

Source/Figure: IRM Zurich, Switzerland
Post-scan role of imaging
Cause of death + evidence

Source/Figure: IRM Zurich, Switzerland; Ruder TD, BJR (2013)
Post-scan role of imaging

Exclusion of conflicting findings

Source/Figure: IRM Zurich, Switzerland
Post-scan role of imaging

Identification

Source/Figure: IRM Zurich, Switzerland
Getting involved in imaging

<table>
<thead>
<tr>
<th>Your place</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Area</td>
<td></td>
</tr>
<tr>
<td>Population</td>
<td></td>
</tr>
<tr>
<td>Autopsy</td>
<td></td>
</tr>
<tr>
<td>Law</td>
<td></td>
</tr>
<tr>
<td>CT access</td>
<td></td>
</tr>
<tr>
<td>Experts</td>
<td></td>
</tr>
<tr>
<td>Cases</td>
<td></td>
</tr>
<tr>
<td>Finances</td>
<td></td>
</tr>
</tbody>
</table>

PRE-scan: conditions
scan: report/storage
Use established infrastructure
POST-scan: case
Use experience to modify process
Working in New Zealand

thomas_ruder@hotmail.com
Postmortem imaging

- Small, but growing
- CT >> CTA >>>> MR >>>>> MRA
- Conditions: pre-scan role
- Case: post-scan role