PULMONARY PATHOLOGY FOR FORENSIC PATHOLOGISTS

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Pathology Update 2019
This session will be in the form of a slide seminar, reflecting 12 years of referral practice from forensic autopsies. The cases will be representative of those submitted for opinion and will encompass a spectrum of neoplastic and non-neoplastic conditions (mesothelioma has been specifically excluded). Digital slides will be made available to delegates for viewing before the meeting.

Examinations without report

No Institution.

3 June 2019

SM

Results:

1. 55 year old male. Admitted to hospital following ineffective resuscitation of COPD. Died after drug administration error. Known history of right lung lobe mass.

2. 71 year old female. Died from multiple injuries following a road traffic accident. Medical history of atrial fibrillation, anemia, hypertension and diabetes mellitus.

3. 56 year old female. Collapsed after acute symptoms of fever. An electrocardiogram on admission to hospital showed large right ventricle. She had petechial and bilateral pleural effusions, petechiae and was hypotensive. Diagnosis of pulmonary hypertension and chronic hepatitis B. Cause of death was confirmed on post-mortem. Medical history of hepatitis B, hypertension and coronary artery disease.

4. 44 year old male. Lived alone in London. Died 6 days after arrival in London following a visit to Bangladesh for several weeks. Complained of shortness of breath and hemoptysis for 4 days prior to being found dead in a bed. Medical history of COPD and previous pulmonary thromboembolism.

5. 39 year old male. Died from drowning.

6. 61 year old male. Died following an episode of significant coughing. Causes of death are suspected to be related to chronic obstructive pulmonary disease.

7. 56 year old female. Died following sudden collapse and respiratory arrest.

8. 88 year old male. Died from sepsis - History of alcohol abuse.

9. 72 year old male. Acute shortness of breath then died.

Request:

No Institution. Forensic Pathology RCA.

No reason for examination.
Case 1

- 78 year old male. Admitted to hospital following infective exacerbation of COPD. Died after drug administration error. Known history of right lung lower lobe mass.

- Background lung appears extremely abnormal. What is the possible relevance to the cause of death?
Haemosiderosis

- Endogenous pneumoconiosis
- Encrustation of elastic laminae of blood vessels and alveolar wall by haemosiderin and calcium
- Foreign body giant cell reaction
- Haemosiderin laden intra-alveolar macrophages
- Perl’s stain stronger than in smokers’ macrophages
- Mild interstitial fibrosis and type II pneumocyte hyperplasia
- +/- capillaritis
Causes of haemosiderosis

- Localised causes (TB; tumours; infarction)
- Generalised bleeding disorders
- Pulmonary hypertension
- Occlusion of pulmonary veins
  - Mitral stenosis
  - Atrial myxoma
  - Mediastinal fibrosis
  - Veno-occlusive disease
  - Lymphangioleiomyomatosis
  - Capillary haemangiomatosis
- Vasculitis (ANCA-related; Goodpasture’s syndrome; immune complex mediated) – pulmonary-renal syndrome
- Chemical injury
- Asphyxia
- Idiopathic (children & young adults)
Case 3

- 60 year old female. Collapsed after acute shortness of breath. An echocardiogram on admission to hospital showed large right ventricle. She had pericardial and bilateral pleural effusions, pitting oedema and was hyponatraemic. A diagnosis of pulmonary hypertension and cor pulmonale was made. Care was withdrawn after an MRI showed hypoxic ischaemic encephalopathy. Medical history of hepatitis C infection, COPD, squamous carcinoma of mouth, right middle lobectomy for extralobar pulmonary sequestration and talc pleurodesis.
“Filler embolism”

- IVDA lung
- Usually starch, talc or cellulose
- May cause pulmonary hypertension

- Post mortem examination of heart confirmed right ventricular hypertrophy
- Histology of liver: refractile material also in portal tracts
Causes of pulmonary hypertension

- Precapillary
  - Constrictive
    - Primary pulmonary hypertension
    - Congenital heart disease
    - Liver disease
    - HIV (antiretroviral drugs)
    - Appetite suppressing drugs
    - Hereditary haemorrhagic telangiectasia
    - Connective tissue disease
  - Hypoxic
    - High altitude living
    - COPD
    - Sleep apnoea
  - Embolic
    - Thromboembolic
    - Parasitic
    - Foreign material
- Capillary
  - Pulmonary fibrosis
  - Capillary haemangiomatosis
  - Diffuse smooth muscle proliferation
- Postcapillary
  - Left sided heart disease
  - Veno-occlusive disease
Histology of pulmonary hypertension

• Medial hypertrophy
  • No muscle in vessels <30 μm diameter
  • Muscle on one side only in vessels 30-100 μm

• Intimal fibrosis
  • Concentric
  • Eccentric (thromboembolic)

• Longitudinal smooth muscle in intima (hypoxic)

• Plexogenic arteriopathy (only in constrictive precapillary causes)
  • Fibrinoid necrosis
  • Dilatation lesions

• Haemosiderosis
Definition of right ventricular hypertrophy

• Right ventricular weight > 80g
• Ratio of weight of left ventricle plus septum to right ventricle < 2:1
Intravascular talcosis

- Nine cases of histologically confirmed intravascular talcosis
- Including five autopsy cases
- Two patients denied history of intravenous drug use
Case 2

- 77 year old female. Died from multiple injuries following a road traffic accident. Medical history of asthma, atrial fibrillation, anaemia, hypertension and dilated cardiomyopathy.

- Do the changes in the lung represent a reactive phenomenon or in situ malignancy?
Lambertosis

- Non-specific effect of chronic brochiolitis
- Results in bronchiolisation (peribronchiolar metaplasia) of adjacent alveolar spaces
- Possible causes include respiratory bronchiolitis and hypersensitivity pneumonitis
- Can mimic lepidic pattern adenocarcinoma or atypical adenomatous hyperplasia
Case 9

- 77 year old female. Died following sudden collapse and respiratory arrest.
Diffuse alveolar damage

- Mortality 70%
- Interstitium expanded by fibroblasts and inflammatory cells
- Hyperplasia and atypia of type II pneumocytes
- Squamous metaplasia
- Thrombi
DAD

- Exudative phase: hyaline membranes
- Organising/proliferative phase: organising pneumonia (COP is more patchy and peribronchial)
- NSIP-like pattern if survives
DAD

• Causes:
  • Infection (especially viral)
  • Inhalation of smoke, toxic gases, high concentration oxygen
  • Aspiration of gastric contents
  • Irradiation
  • Shock, including sepsis
  • Reperfusion injury
  • Cardiopulmonary bypass
  • Acute pancreatitis
  • Fat embolism
  • Paraquat poisoning
  • Chemotherapy
  • Idiopathic (acute interstitial pneumonia, acute exacerbation of UIP)
**Research Article**

**Diffuse Alveolar Damage of the Lungs in Forensic Autopsies: Assessment of Histopathological Stages and Causes of Death**

<table>
<thead>
<tr>
<th>Causes of death</th>
<th>Total cases $n$ (%)</th>
<th>Exudative phase</th>
<th>Proliferative phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire</td>
<td>20 (30)</td>
<td>16</td>
<td>4</td>
</tr>
<tr>
<td>Physical trauma</td>
<td>21 (31)</td>
<td>15</td>
<td>6</td>
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<tr>
<td>Postoperative complication</td>
<td>3 (4)</td>
<td>2</td>
<td>1</td>
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<tr>
<td>Traffic accident</td>
<td>5 (7)</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Occupational accident</td>
<td>2 (3)</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Drug intoxication</td>
<td>2 (3)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Firearm</td>
<td>3 (4)</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Mushroom poisoning</td>
<td>1 (1)</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Corrosive substance intake</td>
<td>1 (1)</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Sepsis</td>
<td>3 (4)</td>
<td>3</td>
<td>1</td>
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<tr>
<td>Sharp trauma</td>
<td>1 (1)</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Alcohol intoxication</td>
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<tr>
<td>Morphine poisoning</td>
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<td>0</td>
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<tr>
<td>Pesticide intake</td>
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<td>0</td>
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<tr>
<td>Unidentified</td>
<td>1 (1)</td>
<td>1</td>
<td>0</td>
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</tbody>
</table>
Case 4

• 81 year old male. Bangladeshi origin, living in USA. Died 5 days after arrival in Australia following a visit to Bangladesh for several weeks. Complained of shortness of breath and haemoptysis for 2 days prior to being found dead in bed. Medical history of COPD, asthma and previous pulmonary thromboembolism.

• At autopsy fresh and altered blood seen around mouth, in larynx, trachea and bronchi; right lung markedly haemorrhagic; small amount of altered blood in oesophagus and stomach
Active secondary tuberculosis

- Likely to have caused fatal pulmonary haemorrhage
Case 8

• 42 year old female. Died of mixed drug toxicity. Medical history of bipolar affective disorder, epilepsy, asthma and pancreatitis.