BEFORE GLOVES & ANTIBIOTICS

A historical review from the daily life as a pathologist

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My remit

• NOT:-
• **Biosafety in the autopsy room**
  • What happens in Spain
• **Prion disease health risks**
  • What happens in France
• **Microbiology sampling at autopsy**
  • What happens in Spain

• **History** – of unsafe practices
  • I started in autopsy work in 1975
• Working practices in UK (Europe) and Africa
• Reflection on autopsy pathologists’ daily concerns then and now
Surgeon General, USA, 1969

“The era of infectious diseases is over. The target is now chronic degenerative and malignant diseases”

William H. Stewart
1965-1969
England & Wales: late-19th century leading causes of death – lots of exposure for morbid anatomists

- Smallpox
- Measles
- Scarlet fever
- Diphtheria
- Whooping cough
- Typhus
- Enteric fever (typhoid)
- Dysentery & Diarrhoea
- Cholera
- Cancer
- Tuberculosis
- Childbirth
- Puerperal fever
- Marasmus
- Suicide

UK Data Archive decennial supplements
Newly recognised infections: 1975-now

- 1975 – B19 parvovirus
- **1976** – Ebola
  - 1976 - Legionella
  - 1977 – Rift Valley HF
  - 1977 – delta hepatitis
  - 1977 – Hantaan virus
  - 1980 – HTLV-1
  - 1982 – E.coli 0157
  - 1983 – Lyme disease
- **1983** – Helicobacter
- **1983** – HIV-1
- 1985 – Enterocytozoon
- 1985 – HIV-2
- **1989** – hepatitis C
  - 1991 – Erlichia spp
  - 1992 – Bartonella spp
  - 1993 – Hantavirus
  - 1993 – Cyclospora
- **1994** – HHV8 (KS virus)
  - 1999 – Nipah virus
  - 2000 – West Nile virus
- **2003** – SARS coronavirus
- **2005** – avian influenza H5N1
- **2012** – MERSCoV
- **2016** – Mycobacterium chimera

Zika virus? – identified 1956
Medieval and early modern practices
Bare hands on, no masks
No personal protective equipment (PPE)

19th Century

1927
The main protagonists of 19th century autopsy

Karl Rokitansky - Vienna
- Gross dissection
- Little/no histology
- Organs studied as directed by clinical colleagues

Rudolf Virchow - Berlin
- All organs examined
- + histology
That discussion – the extent of autopsy examination and additional investigations – is still problematic today.

E.g. the ‘organ retention scandal’ in UK 1999 onwards.
High minded stuff

• **The Society of Mutual Autopsy** [La Société d’autopsie mutuelle] was organized on October 19, **1876** by members of the Society of Anthropology of Paris.

• Its purpose was to facilitate research on any links between personality & ability and brain morphology by creating a system whereby members’ bodies, upon death, would be donated to the Society for study.
William Osler – firm believer in autopsy follow up

- Prosected 100s of cadavers personally
- Montreal General Hospital
  - 1876-1884
- Philadelphia Medical School
  - 1884-1889
Some of the cases Osler examined

• Typhoid
• Peritonitis
• Endocarditis
• Actinomycosis
• Acute pleurisy
• Status thymus lymphaticus

• TUBERCULOSIS

• Many specific case write-ups
• Lots of microscope histology depictions documented
• No mention of gloves or masks
Routes of infection

• Per-cutaneous inoculation – glove puncture
• Inhalation
• Ingestion
• Contamination of mucosae – lips, eyes, nose
• Surface contamination of skin
Two HIV pathologists & the third man circulator. Gloves and masks
Adult pulmonary TB in HIV – and in 1930s Boston USA malnourished children (Arnold Rich) – *multi-bacillary*
Tuberculosis infection risk from autopsy – presumably the same from the 19th century

Templeton et al [USA, 1990s]
- 3-hour TB autopsy
- 5/5 skin-test –ve attending HCWs converted
- 2/5 became sputum+ve 8 weeks later
- 0/40 HCWs on open ward infected

Problems:
- M.tb infection vs disease
- Complication of prior BCG vaccine – Mantoux+ve skin
- MDR-TB problem
HIV+ TB in the pre-cART era
TB acquired in the mortuary
UK laboratory & mortuary-acquired infections

- Norman Grist (1918-1984)
- Chair of Infectious Diseases, Glasgow, Scotland.

- Monitored the steady decline in such infections
- TB, viral hepatitis etc
  - published in Journal of Clinical Pathology
Variably reliable data:
general statement: ‘risk of TB in mortuary workers = x100-200 general public’

- Flavin (2007)
- 1950s: rates of TB in pathologists = 5/1000pa
- 1980s: TB rate = 0.09/1000pa

- NR Grist 1980-81 data
- Morbid anatomist TB rate = 2.5/1000pa

Deaths in Pathological Society hospital
pathologist members 1925-53: Reid DD, BMJ 1957

<table>
<thead>
<tr>
<th></th>
<th>Pulmonary TB</th>
<th>Suicide</th>
<th>All other causes</th>
<th>Total</th>
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<tbody>
<tr>
<td>Observed</td>
<td>10</td>
<td>6</td>
<td>54</td>
<td>70</td>
</tr>
<tr>
<td>Expected</td>
<td>6</td>
<td>2</td>
<td>66</td>
<td>74</td>
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PF3/N95 & surgical mask & neoprene cut-resistant gloves
Gloves – when did pathologists start wearing?

- (nothing) – up to 1889…invention of rubber gloves
- Latex gloves
- ‘Washing-up’ gloves over latex
- Latex over neoprene ‘cut resistant’ gloves
- Latex over metal mesh gloves
- Latex / neoprene / latex triple ‘sandwich’

UK forensic pathologist
- Keith Simpson, retired 1980

- 25yr old anatomical pathology technologist (APT) cut his finger assisting an autopsy on a 73yr old who died of Group A *Streptococcus* septicaemia
- Superficial nick to right index finger
- 36 hours later: emergency dept visit: pain, feeling unwell.

- Rx: penicillin
- 24 hours, cellulitis subsided
- Finger tip became necrotic
- Required amputation

*In the pre-antibiotic era, he would have died*
GAS: uterus necrosis, no inflammation, cocci++

GRAM

- 1916: witnessed military deaths from GAS.
- Autopsy finger pricks: *dip finger into a pot of phenol*

- Clinical observation and question:
  - Why do GAS patients survive, whilst surgeon often dies after finger prick?
  - *Passage* through hosts augments *virulence*.

- Outlook transformed from 1935:
  - Prontosil sulphonamide antibiotic
  - Then penicillin etc

Paul Garrod
1896-1979
Group A *Streptococcus pyogenes* uterine sepsis
Peri/post-partum sepsis

Includes the classic Semmelweis scenario

Acquired from HCWs?
The Semmelweis story

Ignaz Semmelweis
1818-1865

Johann Lucas Boer
[Obstetrician]
1751-1835

Johann Klein
[Obstetrician]
1788-1856

Franz Breit
[obstetrician]
1817-1868
What really happened – male obstetricians as morbid anatomists

Boer: No autopsies on puerperal sepsis (PS) cases

1823. Klein: autopsies essential on PS. MMR

1840. Imperial decree: male and female HCW separate Clinics 1 & 2

1844. Semmelweis joins C1

autopsy-active

1846. Breit replaces Semmelweis. No autopsies. Clinic 1

1847. Semmelweis replaces Breit. Clinic 1
The Semmelweis story

Ignaz Semmelweis
1818-1865

Jakob Kolletschka
[Forensic Medicine]
1803-1847

*Died of GAS after cutting himself on a fatal maternal GAS patient*
What really happened — male obstetricians as morbid anatomists

<table>
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<tr>
<th>Year</th>
<th>Event</th>
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<td>1846</td>
<td>Breit replaces Semmelweis. No autopsies. Clinic 1</td>
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<tr>
<td>1847</td>
<td>Kolletschka dies. Semmelweis realises he had same disease as PS.</td>
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<td><em>NOT only women.</em> ‘Decaying matter on the hands - cadaveric’</td>
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<td>May 1847: chlorine hand wash before PV exams</td>
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<tr>
<td>1847</td>
<td>Ca Cx [GAS-secreting] patient infecting other mothers</td>
</tr>
<tr>
<td></td>
<td>via HCWs hands — <em>so not only cadaveric but also live-patient</em></td>
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<td>transmission</td>
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Chlorine hand-washing: effect on % mortality (Vienna)
Controlling maternal streptococcal sepsis transmission

Semmelweis

GAS
Impact enormous

Puerperal sepsis - Childbed fever
‘thing of the past in developed countries’
– perhaps……………..
HIV & relative risk of serious accident?

HIVs entered *Homo sapiens* ~1920

3,000 miles pa in London
Pathologists & HIV autopsies

• The only (?) pathologist who acquired HIV from an autopsy
  • Pre-antibiotic [cART] era

• “Autopsy risk and acquisition of HIV infection: a case report and reappraisal”
• Johnson MD et al
• Arch Path Lab Med
• 1997: 121:64-66
HIV & relative risk – knowledge & choice

Anatomical pathology technologist (APT) to pathologist:

“Prof, why isn’t this smallpox?”
Without whom..........deep thanks to you all.
CDC (USA) record of medical occupation acquired HIV/AIDS – up to 1992

Lab technician 25
Nurses 26
Physician 13
Paramedic 7
Dentist 6
Health aide 6
Maintenance worker 3
Morgue technician (APT) 3
HIV in Kenya – how not to do it!
Be prepared! Vaccinations

Nigerian student admitted with stridor
Dies whilst being intubated
?RABIES?

E&W Dept of Health insists that only rabies-vaccinated staff can touch the body for autopsy

I had never sewn up a body and scalp before..............................never again

Baden-Powell
Rabies - cerebellum

Frozen section immunofluorescence
Done at Veterinary Research Laboratory
Mortuary APTs – UK vaccination schedule

• Mandatory: BCG, HBV – all staff

• Recommended also:

• HAV, polio, tetanus, diphtheria

• Meningococcus – all serotypes available

• Centres near international airports and with high immigrant communities: rabies, yellow fever (and now smallpox - biowarfare?)
Another day in the life of St Thomas’ mortuary

Yellow fever – post-vaccination death

HIV + TB
The Medico-Legal Society meeting on 12th Dec 1905. Topic: “Post-mortem examinations which do not reveal the cause of death”

Paper read by Dr FJ Smith, Physician to the London Hospital – followed by a general discussion. Reported in full in the BMJ of Dec 16th [sic!]

• A first mention and discussion of the ‘negative autopsy’ problem?
• Discussion of post-mortem decomposition features mimicking true pathological disease
• Worry about the absence of pathognomonic features of many scenarios, particularly acute poisoning and murder
  • The Agatha Christie era of forensic medicine
MLS ‘negative autopsy’ discussion – cont’d (2)

• The crucial input from deceased medical attendants in life
  • Versus

• What can be gained from complete autopsy examination only

• Who should be doing autopsies?
  • ‘Specialist pathologists’?
  • General practitioners?

• Our 21st C answer: BOTH clinical input AND specialist pathological expertise with modern tissue sample investigations are essential for accurate diagnoses
• Coroner: “PM examinations performed by a gentleman who was a medical practitioner and was not generally employed in that [PM] work was not the most satisfactory way of dealing with PM examinations”

• General practitioner: “points in favour of the GP being allowed to do the PM examination as he was the person acquainted with the clinical symptoms”

• “PM examinations as a rule did not need the highest skill; moreover the making of them not only kept the medical practitioner in touch with pathological details, but might reasonably be looked upon as his right, especially when the deceased persons had been his own patient”.

MLS ‘negative autopsy’ discussion – cont’d (3)
Dr AP: “a striking point in his experience was that he had not had a case in which the general practitioner did not give a cause of death, whereas the expert occasionally expressed his inability to give a cause”

Dr WW: “PM examination should be gradually separated from the work of the GP. ........

“Danger to parturient women...

..if that dirty work [PME] needing to be done in the intervals of clinical work. Perfectly aseptic hand were difficult to secure at all times, but after making examinations of the internal organs of the dead, the difficulty was greatly enhanced”.
Thoughts

• No recent historical reviews of autopsy practice mention
  • what our predecessors did (or did not) do re personal protective equipment
  • discuss specific mortality in pathologists and APTs

• Health & safety has improved

• But still controversy over:
  • Who can/should perform autopsies? Only pathologists?
  • Which pathologists should perform which autopsies?
  • How complete should PM examinations be?
  • The respectability of autopsy morbid anatomy as a profession in medicine

• Plus ça change, plus ça même chose