# Review of John Hunter's work regarding cardiovascular events

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John Hunter

# Popliteal artery aneurysm

# Brief history on the management of popliteal artery aneurysm (PAA)

- 1744 Pierre Keyslère - Ligation proximal and distal to the popliteal aneurysm, remove contents within aneurysm i.e. Antyllus' technique
- 1772 Carlo Guattani - Compression of superficial femoral artery and/or compression of aneurysm
- 1785 Pierre-Joseph Desault - Ligation of the popliteal artery proximal to the aneurysm
- 1785 John Hunter - Ligation of the superficial femoral artery, distant from the popliteal aneurysm
- 1888 Rudolph Matas - Endoaneurysmorrhaphy obliterative/restorative/reconstructive
- 1969 W.S. Edwards - Popliteal aneurysm exclusion via proximal and distal ligation with reversed saphenous vein bypass

# Why John Hunter develop a new technique?

- Antyllus' technique - technically difficult and usually fails
  - *“I once saw an attempt of this kind in a true aneurism of the ham, in which i shall only remark that the patient died;” - William Bromfield*

- Amputation - rarely succeeds in preserving the life of a patient and in best cases lead to lifelong disability

*“I would have no one perform an operation that he is not clear about the propriety of”*

*– John Hunter,  Father of scientific surgery*

# Two premises that have to be fulfilled

- Establishment of collateral circulation
- Understanding of aneurysm pathophysiology

# Premise of Hunter's technique - collateral circulation

- The stag horn experiment at Richmond Park conducted to demonstrate the development of collateral circulation - highly debated on whether it has happened or not

- However Hunter was most likely aware of the feature of collateral circulation development
  - *"The circumstances to be regarded chiefly turn upon the collateral branches being sufficient to carry on the circulation."*

# Premise of Hunter's technique - aneurysm pathophysiology

- Hunter challenged the idea of vessel wall weakness alone is sufficient to cause aneurysm

- An experiment was conducted by Hunter where the outer layers of the carotid artery of a dog was dissected off and the dog was left to itself
  - *"the wound had closed on the artery, and the whole was consolidated to and over it, forming a strong bond of union,"*
  - *"and the artery itself was neither increased nor diminished in size."*

- However, the healing process around the weakened carotid artery made others questioned the result

# Premise of Hunter's technique - aneurysm pathophysiology (cont.)

- Another experiment conducted by Sir Everard Home also confirmed Hunter's hypothesis
  - *The outer layers of the femoral artery of a dog was dissected off*
  - *Lint was used to prevent the wounds from healing and closing on top of the artery*
  - *"It was not perceptibly enlarged or diminished, and its coat at this part had recovered their natural thickness and appearance."*

# Hunter’s technique

- December 1785, a 45 year old coachman had been known to have the aneurysm for 3 years
- Incisions were made along the inner margin of the sartorius and later on the fascia covering
- The superficial femoral artery was exposed and 4 ligatures placed along it
- Post-op:
  - *Aneurysm decrease in size by more than a third*
  - *Distal leg became warmer*
  - *Discharged after 6 weeks and was able to return to work eventually*
  - *Died on 1st of April 1787 following an episode of remittent fever*

# Autopsy

- “What remained of the aneurysmal sac was somewhat larger than a hen’s egg, but more oblong, and a little flattened”
- Blood clots filled the inner space of the sac
- Profunda and tibial arteries were found to be ossified
- Popliteal artery joined by a small blood vessel arising either from profunda or femoral artery
- Femoral vein was obliterated and 3 enlarged branches were noted

# Angina pectoris

# Brief history of angina pectoris and cardiac physiology

- Ancient Egyptian and Roman literature documentation
- Increasing documentation across late 17th century to early 18th century
- 1698 Petri Shirak shown importance of coronary artery on cardiac function
- 1768 Dr. William Heberden – Some Account of the Disorder of the Breast
- 1809 Allan Burns- proposed theory that myocardial ischaemia is the cause of angina pectoris
- 20th & 21st century – development of molecular biology establishing underlying reaction

# Contribution of John Hunter

- At his time
  - *Helping fellow physicians – establishing evidence based medicine*
- Modern impact

# Involvement in autopsies

- Dr. Fothergill
- Dr. Edward Jenner X Dr. Celab Hillier Parry
- Dr. William Heberden

# Dr. Fothergill

- John Hunter “the very skillful and accurate anatomist”
- “Showed mitral and aortic valvular disease but apparently not very severe in extent”
- “The two coronary arteries, from their origin to many of their ramifications upon the heart, were become one piece of bone”
- Dr. Fothergill’s interpretation
- “ the state of the parts about the heart fully shew, that under such circumstances, it is impossible to bear with impunity the effects of sudden and violent agitations”

# Dr. Edward Jenner X Dr. Celab Hillier Parry

- John Hunter's autopsy
- "Mr. Hunter… the coronary arteries of the heart were considerably ossified"
- Dr. Edward Jenner
- "The importance of the coronary arteries and how much the heart must suffer from their not being able to perform their functions"
- Dr. Parry – An inquiry into the Symptoms and Causes of the Syncope Anginosa
- "The angina pectoris was a disease of the heart, connected with mal-organization of the coronary arteries"

# Modern traces of his discovery

- Support by molecular biology discovery
- Investigation of sudden cardiac death
  - *Examination of coronary artery is a routine performance*
- Psychoneuroendocrineimmunology

# 1793, St. George's Hospital

- "My life is the hands of any rascal who chooses to annoy and tease me"
- Contribution to medical education

# Psychoneuroendocrineimmunology

- Type A personality, first psychological risk factor of coronary heart disease
- Traits
  - *Inadequate self-esteem*
    - Sir Everard Home noted that he would revise some his lectures for 20 years
  - *Hyperaggressive*
    - “Very warm and impatient readily provoked, and when irritated, not easily soothed”
- Pathophysiology
  - *Chronic stress and anxiety leads to maladaptive stress coping mechanism*
  - *Studies shown that it is correlated with increase inflammatory activity, atherosclerotic plaque formation, hypertension and other relevant risk factors*

# Conclusion

- Evidence based medicine
  - *Observation*
  - *Experimentation*

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# QUESTIONS