Discovery of an Aneurysm Following a Motorcycle Accident

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Patient CC: July 2004

- 65 yo male transferred to the BI from an OSH s/p motorcycle crash w/o a helmet
- CC was thrown from his motorcycle into a fence at 65 MPH
- GCS of 6 on scene; moving all 4 extremities
- Pt intubated at the scene
- Massive head and facial trauma noted
- At the BI: VSS, GCS 11T
The list of potential traumatic injuries is extensive.

Therefore, let’s limit our discussion to head trauma...
Possible Head Injuries?
DDx of Head Trauma

- Intracranial Hemorrhage
  - Subdural Hematoma
  - Epidural Hematoma
  - Subarachnoid Hemorrhage
- Brain Contusion
- Pneumocephalus
- Diffuse Axonal Injury
- Secondary Effects:
  - Edema
  - Brain Herniation
  - Ischemic Infarction
  - Hydrocephalus
- Foreign Bodies
- Skull Fractures
Radiologic Evaluation: Head Trauma

- CT w/o Contrast
  - Acute Hemorrhage, Skull Fractures, Foreign Bodies
- CTA
  - Visualizing vessels
- MRI
  - Edema, Diffuse Axonal Injuries
- MRA
  - Dissections
- Angiography
  - For therapeutic intervention
- Radiographs (historical; included for completeness)
  - Skull Fractures
Patient CC: Axial CT w/o Contrast

- Subcutaneous Air
- Subdural Hematoma in the Midline Falx
- Skull Fracture
- Subarachnoid Hemorrhage
- Parietal Subdural Hematoma

Source: BIDMC, PACS
Patient CC: Axial CT w/o Contrast

- Subcutaneous Air
- Focal Bleed: Likely Aneurysm
- Subarachnoid Hemorrhage
- Pooling of Blood in the Basilar Cistern

Source: BIDMC, PACS
Anatomy

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What is an aneurysm?
Cerebral Aneurysm: Definition

- Dilatation, bulging, or ballooning of part of the wall of an artery in the brain
- Can occur at any age; much more common in adults than in children
- Slightly more common in women than men

Source: http://neuro.wehealny.org/endo/cond_aneurysms.asp
Unruptured Cerebral Aneurysm: Symptoms

- Symptoms depend on size and rate of growth:
  - Small (<11mm): generally asymptomatic
  - Large (11-25 mm) and Giant (>25mm) aneurysms with steady growth: loss of feeling in the face, problems with the eyes, etc.
  - Typical description when ruptures: “worst headache of my life”

Source: www.apps.uwhealth.org/health/adam/hie/2/17031.htm
Risk Factors for Developing Aneurysms

- Risk factors:
  - Smoking
  - Family History of Brain Aneurysms
  - Inherited Disorders:
    - Ehlers-Danlos Syndrome
    - Polycystic Kidney Disease
    - Marfan's Syndrome

Source: NEJM
Radiologic Evaluation: Unruptured Cerebral Aneurysm

- CT
  - Often an incidental discovery
- CTA
  - To visualize vasculature
- MRA
  - If concern of dissection
- Angiography
  - Typically combined with therapeutic intervention
Patient CC: Axial CTA w/Contrast 4 months later

Central Opacification of the Aneurysm with Surrounding Thrombosis

Middle Cerebral Arteries

Source: BIDMC, PACS
Patient CC: Axial CTA w/Contrast 4 months later

Central Opacification of the Aneurysm with Surrounding Thrombosis
Patient CC: CT 3-D Reconstruction 4 months later

Posterior Oblique View of the Circle of Willis
Patient CC: CT 3-D Reconstruction 4 months later

Left Lateral View of the Circle of Willis
Our Patient’s Aneurysm is Located at the Junction Between the Anterior Communicating Artery and the Left Anterior Cerebral Artery.

Let’s Look at More Images of Our Patient’s Aneurysm...
Patient CC: Angiogram 4 months later

Frontal View Following Contrast Injection into the Left Common Carotid Artery

Source: BIDMC, PACS
Patient CC: Angiogram 4 months later

Frontal View Following Contrast Injection into the Right Common Carotid Artery

Source: BIDMC, PACS
Patient CC: Axial MRA Source Data Image 4 months later

Mixed Signal Intensity Suggestive of a Partially Thrombosed Aneurysm
Patient CC: Time-of-Flight MRA 4 months later

Posterior Oblique View of a Maximum Intensity Projection of the Circle of Willis

Our Patient’s Aneurysm is Difficult to Visualize! Why? This is Likely Due to Poor Flow Through the Partially Thrombosed Aneurysm

Source: BIDMC, PACS
Unruptured Cerebral Aneurysms: Treatment

Surgical Clipping

Micro-coil Thrombosis
Coiling

- Guglielmi detachable coil (GDC) embolization introduced in 1991
- Soft and flexible microcoiled platinum wire with intrinsic helical memory
- GDC embolization involves transarterial delivery via microcatheter

Source: NEJM
Patient CC: Angiogram s/p Coiling 6 months later

Left Lateral Oblique View with Contrast Injection into the Left Common Carotid Artery

Source: BIDMC, PACS
Patient CC: Review

- Trauma
- CT w/o Contrast and Discovery of Aneurysm
- Follow-up Imaging: CTA, MRA, Angiography
- Therapeutic Intervention: Angiography with Microcoil Thrombosis
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Main References

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