ADVANCES IN NEUROINTERVENTIONAL THERAPY: 2023 UPDATE

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Objectives

- To understand the role of the neurointerventional team in the care of neurovascular patients
- To understand there are a variety of safe and effective endovascular techniques to treat brain aneurysms
- To appreciate the safety and effectiveness of intra-saccular flow diversion

Who we are

- 3 neurointerventionalists
  - Alexander Copelan, MD
  - Josser Delgado, MD
  - Yasha Kayan, MD
- 2 nurse practitioners
  - Ashley Ertelt, NP
  - Karolina Simenson, NP
- We provide 24/7 neurointerventional coverage for the highest volume brain aneurysm center in the Upper Midwest

What we do

- Endovascular work
  - Cerebral and spinal angiography
  - Embolization of brain aneurysms, both ruptured and unruptured
  - In 1995, this meant coiling
  - In 2003, definitely not just coiling: far from it
  - Embolization of brain (and spine) AVMs, AVF’s, tumors
  - Mechanical thrombectomy for acute stroke (and venous sinus thrombosis)
  - Embolization for epistaxis, bleeding H&N tumors
  - Intracranial and carotid angioplasty and stenting
  - Venous sinus stenting

- Diagnostic Neuroradiology
  - All MRI and CT of our patients, e.g. brain aneurysm follow-up and screening
  - All CTA’s of the head and neck, CT perfusion
  - Clinically driven patient selection for stroke intervention

- Spine work
  - Vertebroplasty / kyphoplasty
  - Spine, head and neck biopsies, disc aspirations
  - Epidural and spinal nerve injections
  - LP’s, myelography, blood patches
  - Lumbar drains
Abbott Neurointerventional Clinic

- Complete aneurysm care
- Evidence-based patient counseling
- Brain aneurysm surveillance
- Family screening
- Pre-operative medical management
  - Dual antiplatelet therapy
  - Optimize management of comorbidities
- Vigilant post-operative management
- Short, medium and long term, life-long follow-up

Brain aneurysm follow-up

- Surveillance
  - 1 year
  - 2 years
  - 5 years
  - 10, 15, 20, 25 etc
- Family screening
  - 5 to 10 year intervals depending on risk
- After treatment, depending on stability
  - 30 days (if ruptured)
  - 6 months
  - 1 year
  - 2 years
  - 5 years
  - Every 5 years for life (or until ninth decade of life)

Hospital care, elective

- Elective aneurysms, AVFs, angioplasty/stenting
  - General anesthesia
  - Admitted to our own service
  - Almost always a 1-night stay on the neuro floor (not ICU)
- Diagnostic angiography
  - Moderate sedation by radiology nursing staff
  - Pre-postoperative care in department
  - Typically 2 hours for recovery
- Elective AVMs
  - General anesthesia
  - High risk brain AVMs often admitted to neuro ICU for one night for strict blood pressure control

Hospital care, urgent/emergent

- Ruptured aneurysms/AVMs obviously always in the neuro ICU
- We actively participate in the care and management of these critically ill patients as part of the multidisciplinary team
  - Neurointensivist
  - Neurosurgeon
  - Neurologist
  - Nursing
  - Nrehab
  - Npharmacy
- Family support, education, counseling
- Participation in care conferences

Back to basics

- What is a brain aneurysm?
- Brain aneurysm types
**Back to basics**

- Brain aneurysm types

**Signs and symptoms, ruptured**

- Sudden onset of worst headache of life
- Nausea & vomiting
- Stiff neck
- Blurred or double vision
- Loss of consciousness

**Signs and symptoms, unruptured**

- Most unruptured aneurysms do not cause symptoms
- Minority of unruptured aneurysms may cause symptoms depending on size and location
  - Headaches
  - Cranial nerve palsies

**Endovascular treatment options**

- Coiling
- Balloon-assisted coiling
- Stent-assisted coiling
- Intra-vascular flow diversion
- Intra-saccular flow diversion
Surgical clipping, 1937

Coil embolization
First in human: 1991
GDC FDA approved: 1995

Neurointerventional suite

Complex access

Embolization procedure

Framing coil
Clotting, endothelialization

Balloon-assisted coiling
First described in 1997

Stent-assisted coiling
Neuroform stent FDA approved in 2002

Flow diversion
Pipeline approved in 2011

Pipeline (PUFS trial)
- Outcomes at 180 days
  - Complete occlusion: 73.6%
  - Major stroke or death: 5.6%
- Outcomes at 5 years
  - 98.2% occlusion rate
  - No additional major strokes or death
  - No reports of delayed recanalization
Young man with HIV-related dilating vasculopathy

Early Pipeline case

Higher complication rate?

Current antiplatelet protocol

- For ruptured aneurysms
  - 325 mg aspirin, 2 hours prior to embolization
  - 81 mg aspirin daily, starting on POD 1

Continuing the conversation