# Stroke

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# Stroke

- Incidence 1-2 / 1000 / year
- #3 in mortality
- #1 in morbidity
- TIA defined
  - » Symptoms < 24 hours
  - » No lesion on imaging

# Stroke: Risk Factors

- Age
- Hypertension
- Smoking
- Cardiac disease
- Carotid disease
- DM
- Hyperlipidemia
- Migraine
- Obesity
- Heavy alcohol use
- Hypercoagulable
- Males
- Heredity
- OCPs (venous)

## Stroke: Case

- A 75 yo presents with left hemiparesis. The exam shows mild weakness, hyper-reflexia and upgoing toe.

## Stroke: Etiology

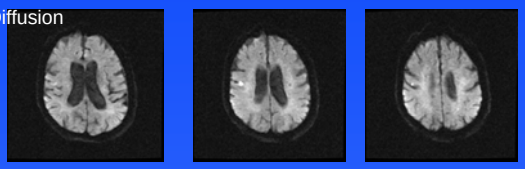
- Embolic
- Thrombotic
  - » Small deep penetrating artery (lacune)
  - » Large artery
- Hypoperfusion
- Hemorrhagic
- Other (venous, metabolic)
- Undetermined

## Stroke: Work-up

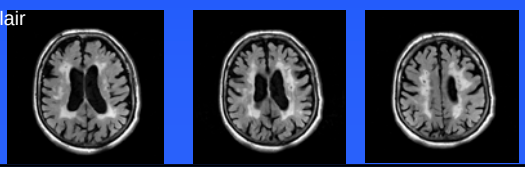
- H&P, CT, EKG
- Carotid duplex
- Diffusion weighted MRI
  - » Positive for 2-3 weeks
- ECHO (TTE vs TEE) with bubble study
- TCD (Transcranial doppler) +/- emboli
- Angiogram (catheter, MR, CT)
- Labs: ESR, ANA, CSF, syphilis, toxicology, hypercoagulable(APLAS)

## What's Acute

Diffusion



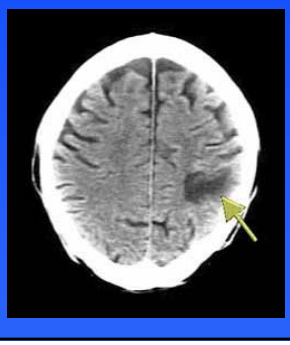
Flair



## Stroke: Embolic

- Atrial fibrillation for example
  - » 16% of all infarcts
  - » Risk per year:
    - – Overall 5%
    - – Lone A-fib <1%
    - – Previous stroke 12%
- Treatment depends on source

## Stroke: Embolic



## Stroke: Thrombotic

- Large artery
  - » Underlying atherosclerosis
  - » Antiplatelet or anticoagulation
- Lacunar
  - » Lipohyalinosis
  - » HTN, DM, Smoking
  - » Antiplatelet

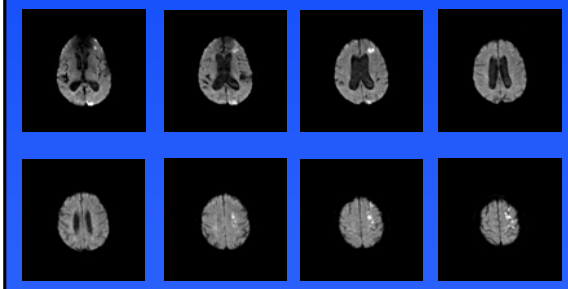
## Stroke: Large Artery


## Stroke: Lacunar

## Stroke: Hypoperfusion

- Large vessel disease, cardiac arrest
- Border zone infarcts
- Treatment varies
  - » Endarterectomy
  - » Angioplasty
  - » Stents
  - » Surgical bypass

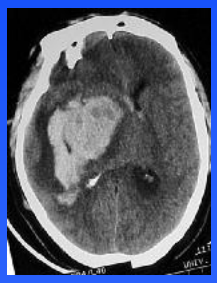
## Stroke: Hypoperfusion



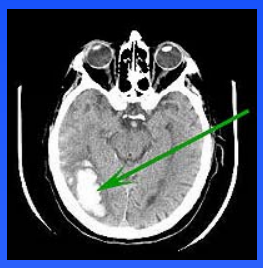
## Stroke: Hemorrhagic

- HTN most common
- Vascular malformations
- Amyloid angiopathy
- Treatment
  - » Control HTN
  - » Avoid blood thinning
  - » Surgery

## Stroke: Hemorrhagic



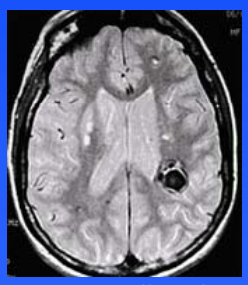
HTN



Amyloid angiopathy

## Stroke: Hemorrhagic

Subarachnoid hemorrhage



Cavernous malformation

## Stroke: Carotid

- Symptomatic
- < 70% stenosis
  - » Antiplatelet
- > 70% stenosis
  - » Endarterectomy
  - » 2-year stroke recur.
    - – 26% medical
    - – 9% surgical

- Asymptomatic
- < 80-90%
  - » None or Antiplatelet
- >80-90%
  - » Endarterectomy

## Stroke: Treatment

- Acute
  - t-PA
  - ASA
  - Rare need for heparin
- T-PA criteria
  - Sxs < 3 hrs, not improving
  - Age 18-80
  - Head CT no blood and small hypodensity
  - SBP < 185, DBP < 110
  - Glucose 50-400
  - Plts > 100K
  - Not on coumadin
  - No recent bleeds
  - No recent surgery
  - No seizure at stroke onset
  - No recent head trauma

## Stroke: Treatment

- Chronic: Primary prevention
  - Risk factor reduction
  - ASA has not shown benefit in general
  - Disease specific
- Chronic: Secondary prevention
  - Disease specific

## Stroke: Treatment

- Antiplatelet
  - ASA
  - Ticlopidine
  - Clopidogrel
  - Aggrenox
- Anticoagulation
  - Heparin
    - Goal PTT 50-80
    - Never bolus
  - Coumadin
    - Usual INR 2-3
    - INR 3-4
      - Prosthetic valves
      - APLAS?

# Acute Treatment

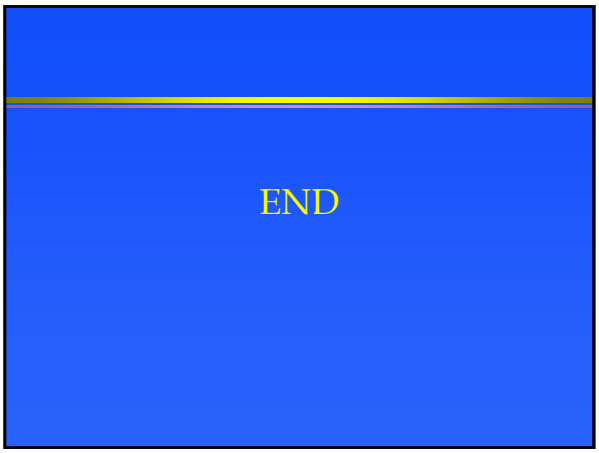
| Etiology | Treatment |
|---|---|
| Any stroke | Avoid hypotension. Treat > 210/120 (labetolol)<br>SaO2 > 92%<br>Glucose control<br>Normothermia<br>Euvolumia<br>Mg++ > 2.0<br>DVT prophylaxis<br>NPO if concerned |
| Venous thrombosis | Heparin |
| Ischemic stroke (arterial) | t-PA if criteria are met, ASA if not |
| Exceptions in ischemic stroke | |
| Recurrent emboli | Heparin |
| Extra-cranial dissection | Heparin |
| Impending carotid/basilar occlusion | Heparin |
| Hemorrhagic stroke | |
| While on Coumadin | Vit K and fresh frozen plasma |
| While on antiplatelets | Platelets |

# Chronic - Primary Prevention

| Etiology | Treatment |
|---|---|
| Lifestyle | Exercise<br>Smoking cessation<br>Mild alcohol consumption |
| Migraine w/ aura | Higher risk with OCPs |
| Hyperlipidemia | Diet<br>HMG-CoA reductase inhibitors, other |
| Diabetes mellitus | Tight glycemic control |
| Hypertension | RP < 140-160/90 |
| Atrial fibrillation | |
| Risk factors | Anticoagulation |
| Lone a-fib (rare) | Antiplatelet |
| CHF | |
| EF <25-30% | Anticoagulation |
| EF >25-30% | Antiplatelet |
| Mechanical heart valve | Anticoagulation (INR 3-4) +/- ASA |
| Carotid stenosis (asymptomatic) | |
| Mild or moderate grade | None |
| High grade >90% | Probably endarterectomy |
| Occlusion | None or Antiplatelet |
| Vascular malformations | |
| Type dependent | Resection<br>Radiation<br>Interventional radiology (coils, glues)<br>None |

# Chronic - Secondary Prevention

| Etiology | Treatment |
|---|---|
| Embolic | |
| Atrial fibrillation | Anticoagulation(64% risk reduction over placebo) |
| CHF | Anticoagulation |
| Pre-cardiac (right-to-left shunt) | Anticoagulation<br>Surgical closure |
| Septic | Antibiotics |
| Artery-to-artery | |
| Carotid | Antiplatelet (Anticoagulation? if failure) |
| Aortic arch | Antiplatelet (Anticoagulation? if failure) |
| Vertebral | Antiplatelet (Anticoagulation? if failure) |
| Antiphospholipid Ab syndrome | Anticoagulation (INR 2-4) |
| Carotid stenosis | |
| <70% | Antiplatelet |
| >70% | Endarterectomy |
| Thrombotic | |
| Large vessel | Antiplatelet or Anticoagulation |
| Small vessel (lacunar) | Antiplatelet |
| Vasculitis | Immunosuppression |
| Venous thrombosis | Anticoagulation |
| Hemorrhagic | |
| Amyloid angiopathy | BP control, avoid ASA or Coumadin |
| Hypertensive | BP control long term |
| Vascular malformations | Type dependent |
| Hypoperfusion (non-carotid) | Relative hypertension |
| Subclavian steal syndrome | Stent, angioplasty |
| Intracranial stenosis | Arterial bypass |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