



Current Strategies and Treatment for Cerebral Vein Thrombosis

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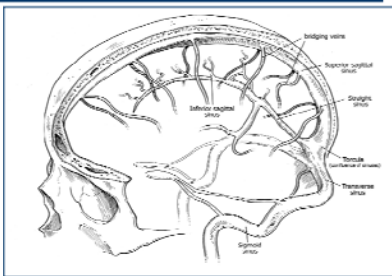



Disclosure

- The authors have no conflicts of interest to report




Venous Anatomy


Cerebral Vein Thrombosis

- Rare cause of stroke, accounting for 0.5%
- Tertiary care centers can expect 5-8 cases per year
- Overall mortality rate ranges from 5-30%
- Complex cases can lead to 50% mortality




Introduction

- Can be difficult to diagnose
 - Wide variety in presentation, severity, course
- Neurosurgeons often consulted by stroke service for management
- Patients failing conservative therapy may need surgical intervention
 - Endovascular
 - Open




Epidemiology

- Primarily affects young, otherwise healthy adults
- Women affected 3:1
- Any condition associated with hypercoagulability should be considered
 - OCP's, HRT
 - Infection
 - Pregnancy, Puerperium
 - Dehydration
 - Vasculitis
 - Factor V Leiden
 - Malignancy
 - Protein C or S def.




Epidemiology

- Most common risk factors in women:
 - OCP/estrogen use, pregnancy, puerperium
 - 65% have >1 risk factor
- Most common risk factors in men:
 - Germ cell malignancies, dehydration, hematologic disorders
 - Men more likely to have 1 risk factor




CVT and Pseudotumor cerebri

- Evidence that some cases of pseudotumor (IIH) may be due to undiagnosed CVT
- Some suggest that patients with IIH should be worked up with MRI and MRV
- Linn, et al. found that 9.4% of patients meeting criteria for IIH had CVT on MRV




Diagnosis

- Initially misdiagnosed in up to 73%
- Delay of >10d occurs in 40% of patients
- Signs and symptoms extremely varied
- Most common symptom: HA (90%)
 - Can be "worst HA of life"
- May mimic tumor, abscess, encephalitis, arterial stroke




Diagnosis

- Symptoms
 - Nausea/Vomiting
 - Weakness
 - Migraine
 - Tinnitus
 - CN palsy
 - Psych syx
 - Death
- Signs
 - Ocular
 - Motor deficits
 - Sensory deficits
 - Seizure
 - Aphasia
 - Coma
 - AMS
- For any vague neurological complaint, CVT should be included in the differential



Localization

- Although not specific for CVT, some signs and symptoms can be correlated to location
 - Cavernous sinus: Ocular symptoms
 - Isolated cortical vein thrombosis: Focal motor or sensory deficits
 - Superior sagittal sinus: Seizure or bilateral deficits
 - Transverse sinus: Aphasia
 - Deep cerebral vein: Coma, AMS, bilateral motor difficulties



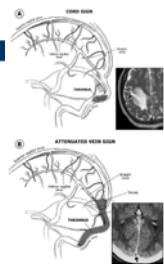
Prognosis

- Very unpredictable
 - Isol. HA can quickly deteriorate; patients with focal deficits may recover completely
- Poor prognostic indicators
 - **Coma** "worst overall prognostic variable"
 - Male
 - Age >37
 - Altered mental status on admission
 - Hemorrhage on admission CT
 - Deep cerebral vein involvement
 - CNS infection
 - Malignancy

International Study on Cerebral Vein and Dural Sinus Thrombosis, 2004

Imaging

- CT is first-line, often followed by MRI
 - Ischemic changes due to venous insufficiency
 - Hyperdensities representing thrombosed veins or sinuses
- Other methods to diagnose: CTA, MRI, MRV
 - Together, MRI/MRV or CT/CTA sensitivity approaches 100%
 - Angiography is the gold standard



A: The cord sign as it appears in situ. B: The attenuated vein sign and empty delta sign

Therapy: Medical

- Appropriate critical care measures
 - May include intubation, seizure prophylaxis
- Anticoagulation attenuates propagation, even in cases where hemorrhage is detected
- Choice of how to proceed depends on deterioration, lack of improvement, or signs of extensive venous compromise

Steroids and CVT

- In a prospective study comparing death or dependence at six months, patients treated with steroids had same outcomes as those not treated
 - May be due to their prothrombotic properties
- Patients without an intraparenchymal lesion on imaging had worse prognosis with steroids

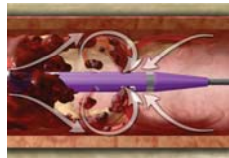
Stroke 39:347-351, 2004

Therapy: Interventional

- Direct endovascular thrombolysis with rtPA
 - Risk of causing or worsening hemorrhage
- Balloon thrombectomy
 - Risk of reocclusion
 - Useful in preexisting hemorrhage
- Mechanical Thrombectomy
 - Angiojet® Xpedior®
 - Merci® endovascular retrieval

Therapy: Interventional

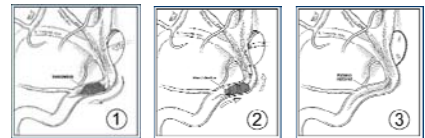
- AngioJet® Xpedior® (Possis Medical)
 - Rheolytic catheter
 - Six high-velocity saline jets create a pressure gradient for 360° removal of clot
 - Low-pressure region draws fragments of clot from the dural wall into exhaust lumen
 - Improvement in 75% of patients



Angiojet rheolytic catheter
<http://www.medrad.com/en-us/info/products/PublishingImages-Gallery-400/Xpedior-3.jpg>

Therapy: Interventional

- Merci® Retriever
 - Flexible nickel-titanium wire
 - Assumes pigtail configuration
 - Tip passed distal to thrombus and is rotated while retracting
- To circumvent problem of tortuous vessels, transcranial approach has been suggested





Therapy: Surgical

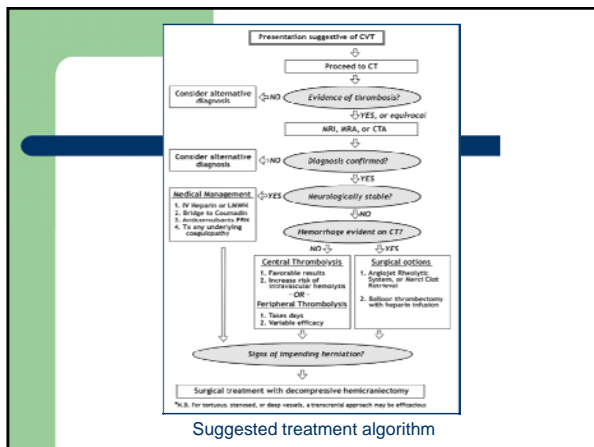
- Some patients may have/develop signs of impending herniation
 - Increased ICP reaches a point where it cannot be compensated for by decrease CSF or collateral flow
- Validated approach is decompressive hemicraniectomy
 - One study 84.6% (11/13 cases)
 - Patients with coma, fixed pupils had complete recovery
- Need for prospective analysis

Stroke 40:2233-2235, 2009



Follow-up

- Treat any coagulopathies to reduce likelihood of reoccurrence
- Follow-up imaging (MRI and MRV)
- 80% return to independence
- Common complaints at follow-up: HA, fatigue, depression



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