

Cerebral Venous Thrombosis in Children

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Objectives

- Case Presentations
 - Case 1
 - Case 2
- Keypoints: Cerebral Venous Thrombosis in Children
- Discussion

Case 1

Identification and Chief Complaint

September 3rd 2017

V.A.S., 14 years old, male, born and raised in São Paulo, Brazil

Previously healthy

Admitted at the E.R. with left visual loss and altered level of consciousness

Recurrent episodes of headaches during the past 30 days, blurred vision and poor balance.

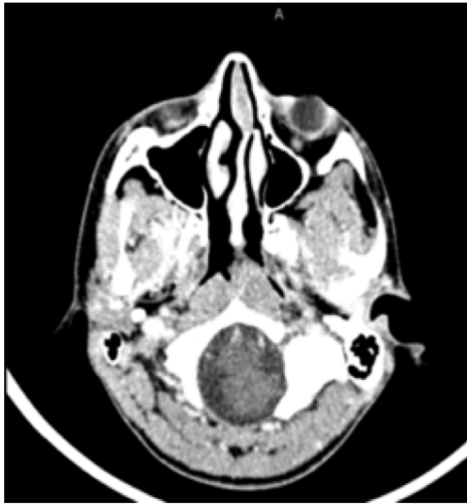
Physical Examination

Non alert

GCS = 7

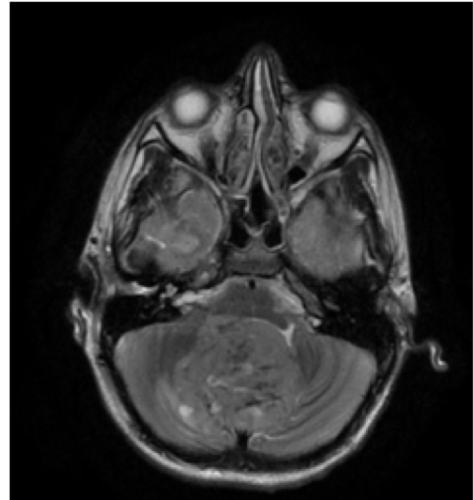
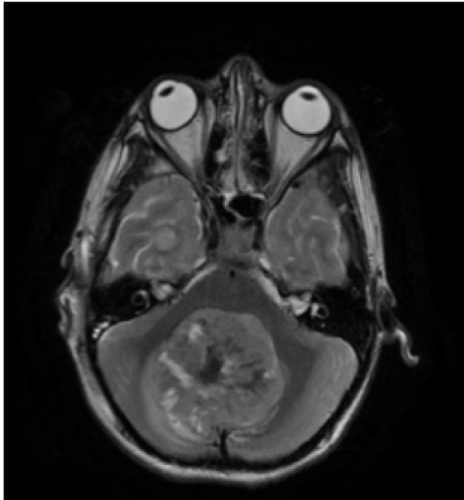
→ Successful endotracheal intubation performed and a CT was ordered

CT scan - Sep 3rd



Posterior fossa tumor that compresses the brainstem \Rightarrow Ventriculoperitoneal shunt

MRI scan – Sep 4th



Imaging Differential Diagnosis and Treatment

Infratentorial mass, with partially defined limits, occupying the fourth ventricle and measuring 6.1 x 5.6 x 5.5 cm.

- Consider Embryonic Tumors (e.g., medulloblastoma, atypical rhabdoid teratoid tumor)

→ Resection of the mass

- Pathology Report: Classic Medulloblastoma (WHO Grade IV) - Beta catenin +

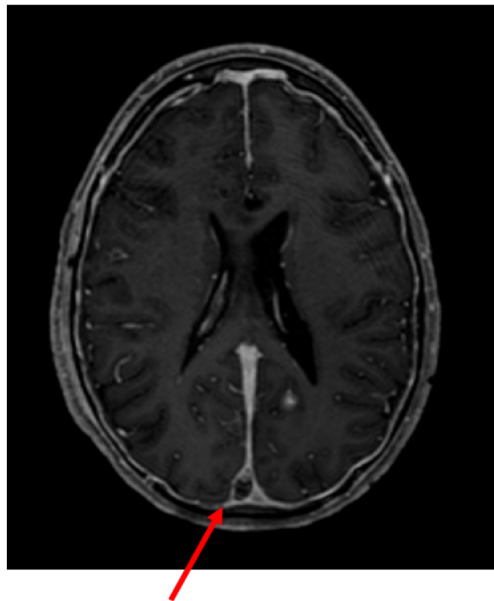
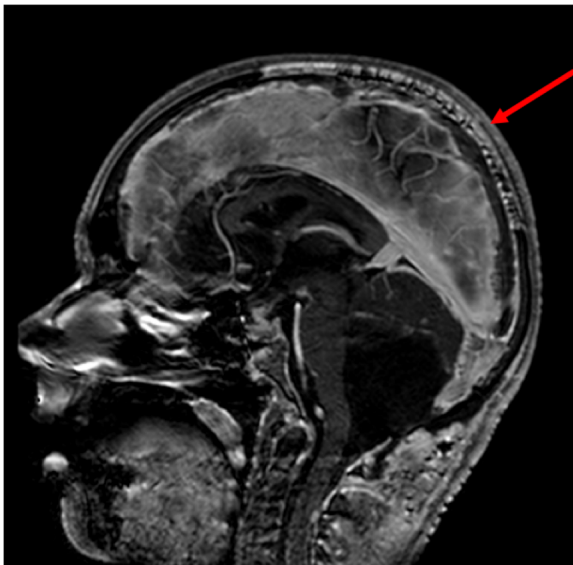
Day 1 postoperative CT



Clinical progress

- Good progress, extubated
- Maintained blurred vision
- ICU discharge on Sep 12th

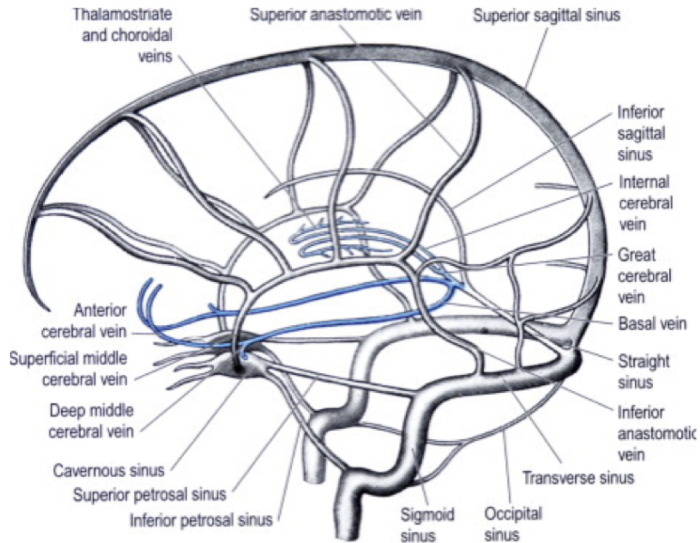
Magnetic Resonance Angiography (MRA) - Sep 14th



Filling defect within the superior sagittal sinus



Sinus Venosus

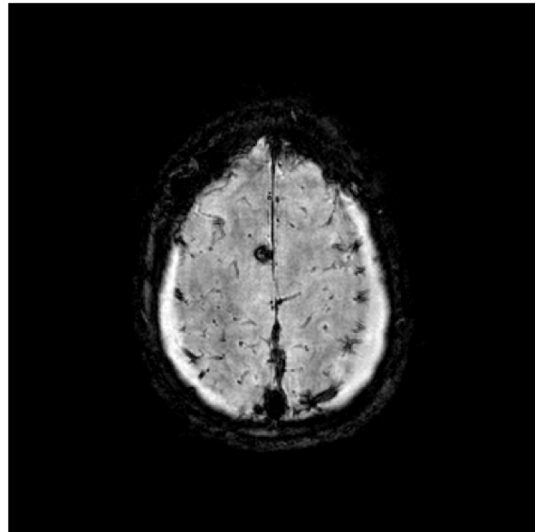
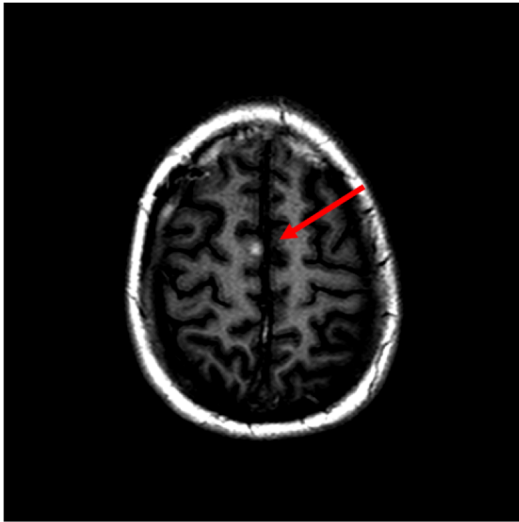


Greenlee J, Handbook of Clinical Neurology 2010



Intraparenchymal Bleeding

- Right superior frontal gyrus



Questions

- Would you treat this patient?
- If yes, what anticoagulant therapy would you choose and how would you monitor it?
- How long would the treatment last?

Treatment

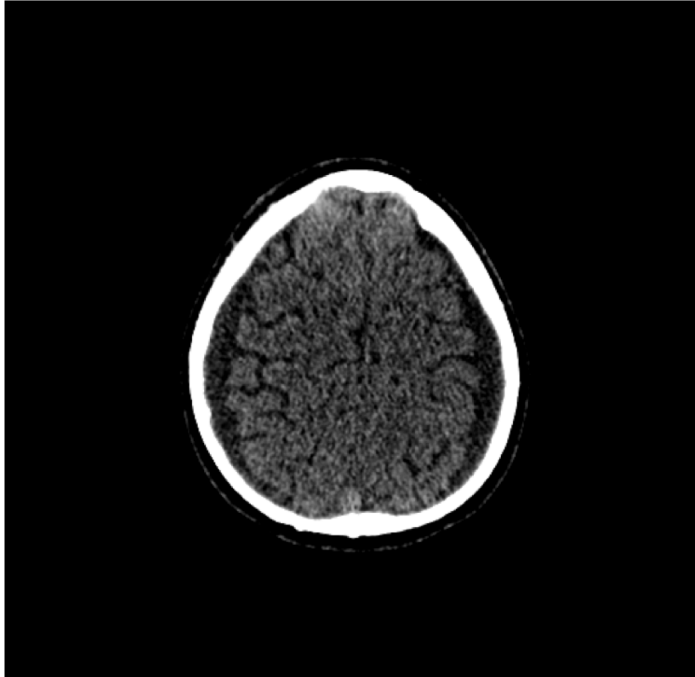
Anticoagulation using Low Molecular Weight Heparin (LMWH):

- Enoxaparin 1mg/kg/dose q12h

Labs:

- Hb=10.8 / Hct=31.2 / WBC=11360 / Plt=264k
- Fibrinogen= 313
- aPTT= 23.1s / R=0.8
- PT=13s / Prothrombin activity= 88%
- D-Dimer=5238

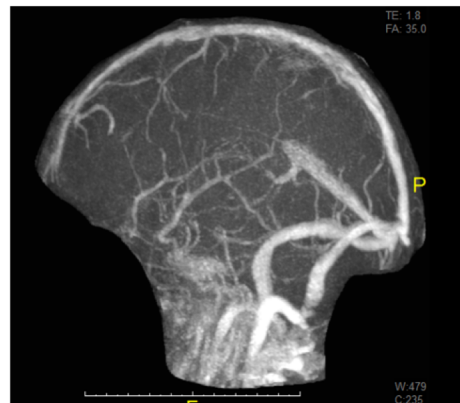
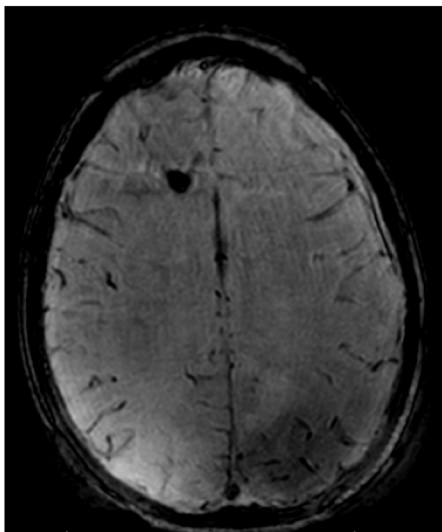
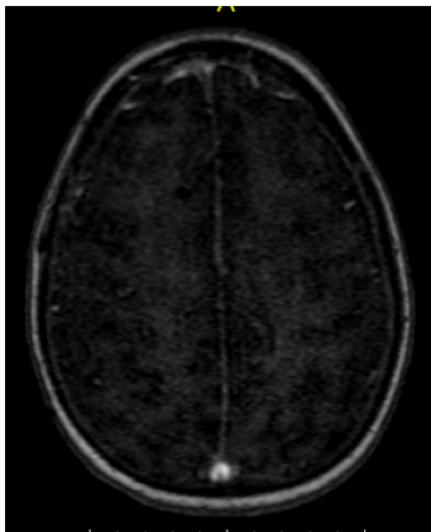
CT Scan 4 days after beginning anticoagulation



No bleeding signs

MRA 3 months later

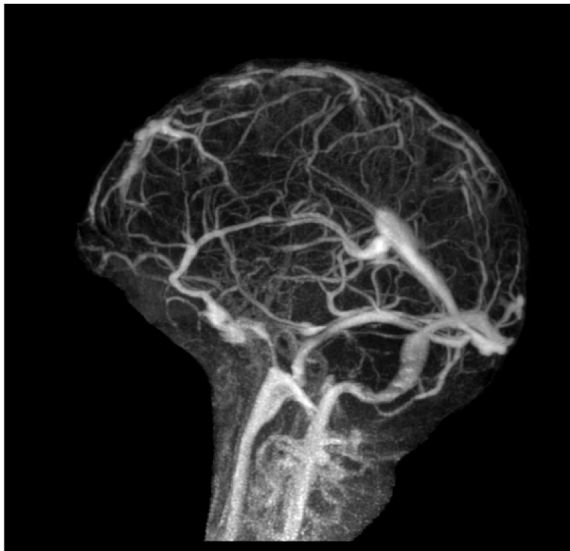
- Recanalization of the superior sagittal sinus



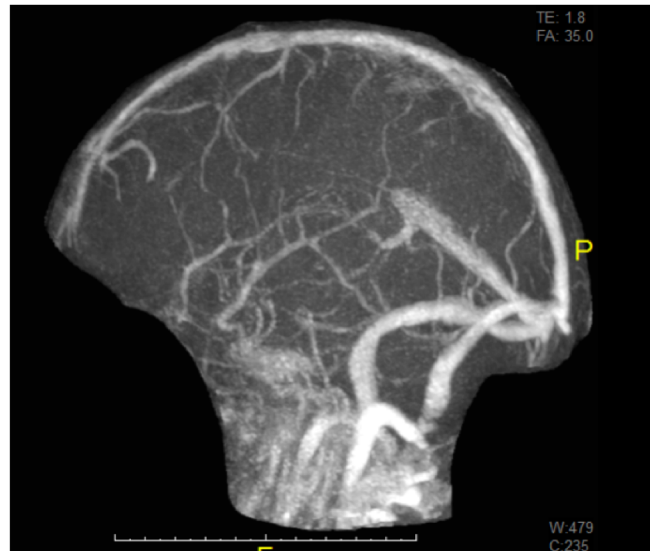
End of anticoagulation treatment –
Patient continued chemotherapy sessions + radiation therapy + prophylactic Enoxaparin

MRA after 3 months

- Recanalization of the superior sagittal sinus



Before



After

Clinical progress

Partial visual loss

Grade 4 muscle weakness

No complaints or bleeding

Case 2



Identification and Chief Complaint

September 2nd 2017

A.C.S.M., 3 years old, female, born and raised in São Paulo, Brazil

Previously healthy

Admitted at the E.R. with a 2-day history of fever and vomiting

Right Otitis Media diagnosed in another service, treated with azithromycin.

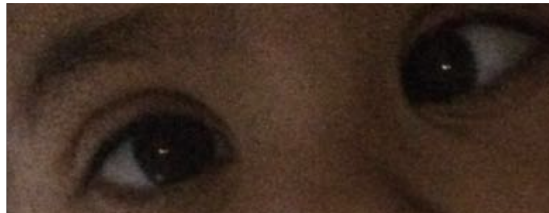
Developed with worsening of symptoms and bilateral convergent strabismus, more accentuated to the right

Physical Examination

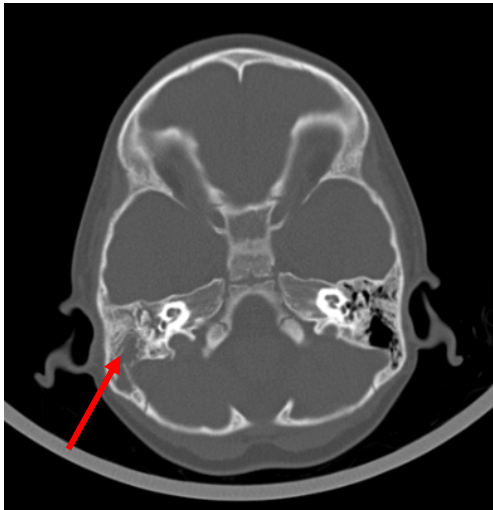
Alert, fully conscious, oriented as to time and place

Right tympanic membrane with signs of inflammation

Bilateral convergent strabismus, more accentuated to the right



Acute Otomastoiditis

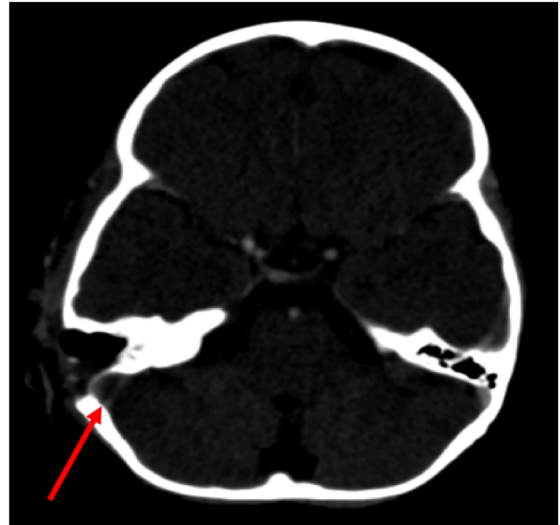
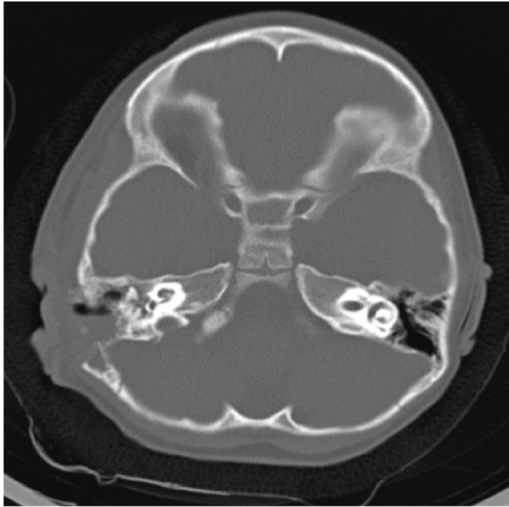


Treatment

Sep 3rd

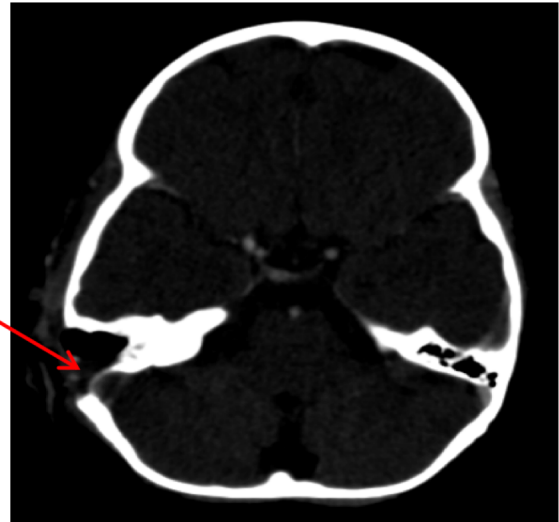
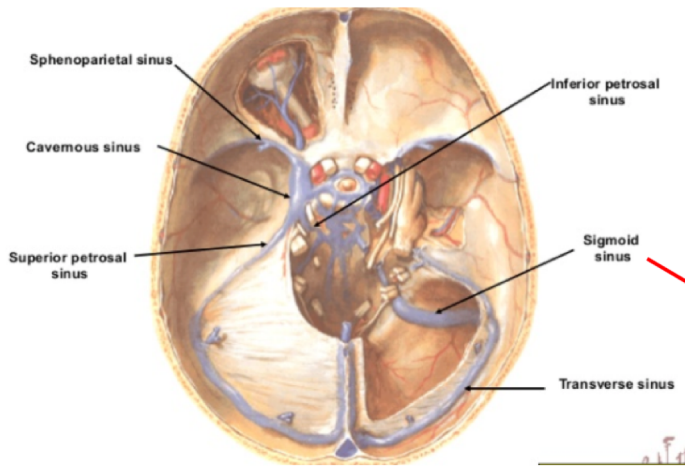
- Ceftriaxone 100mg/kg
- Right Mastoidectomy

CT Scan post surgery



Acute thrombosis of the right sigmoid sinus

Sinus Venous



Netter's Introduction to Imaging E-Book

CT Scan post surgery



Acute thrombosis of right internal jugular vein

Questions

- Would you treat this patient?
- If yes, what anticoagulant therapy would you choose and how would you monitor it?
- How long would the treatment last?

Treatment

Sep 6th Anticoagulation using Unfractionated Heparin (UFH)

- No complications

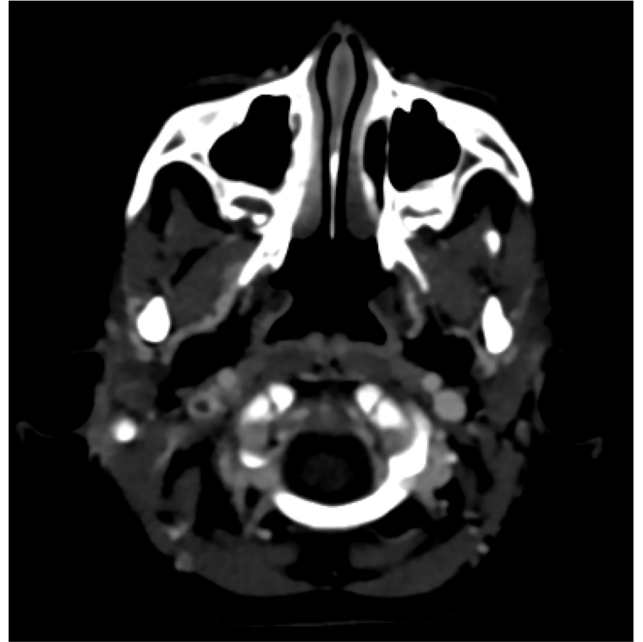
Sep 9th Enoxaparin 1mg/kg/dose q12h

Neuro: Acetazolamide (Diamox) + Repeated lumbar punctures

Ophthalmologist: Ocular Buffer

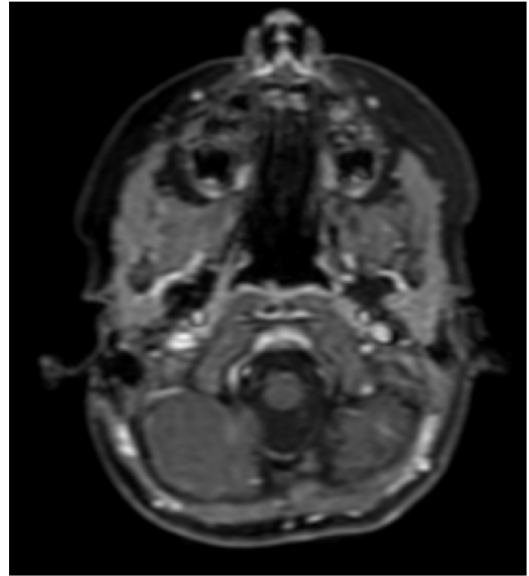
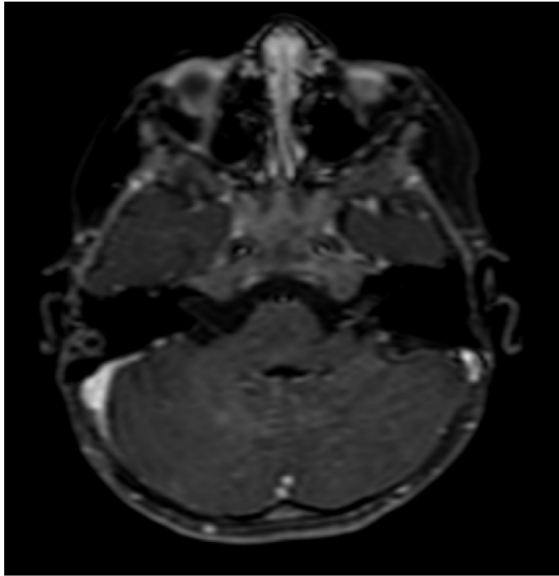
- Hb=9.8 / Hct=28 / WBC=14310 / Plt=4144k
- Fibrinogen= 442
- aPTT= 19.2s / R=0.69
- PT= 13s / Prothrombin activity= 86%
- D-Dimer=2116

1 month later



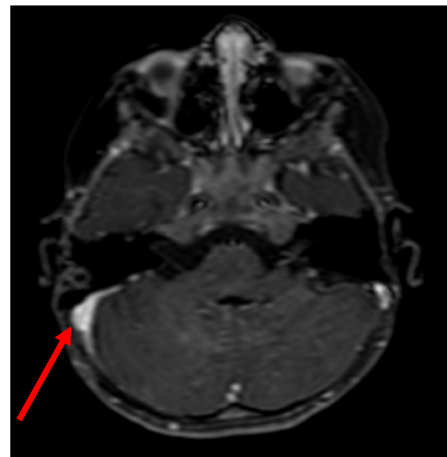
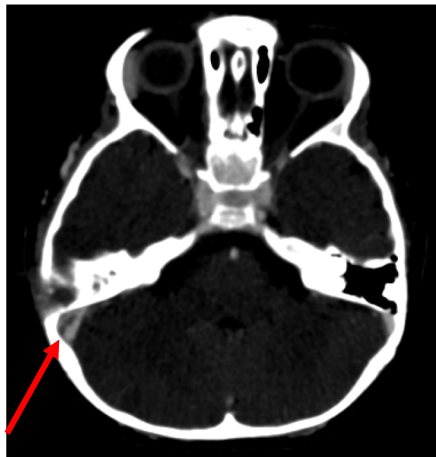
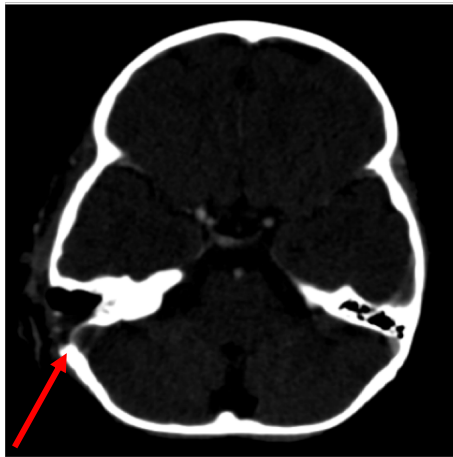
Partially recanalized right sigmoid sinus and right internal jugular vein thrombosis

6 months later

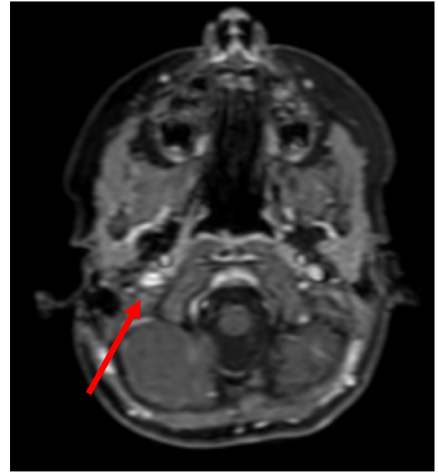
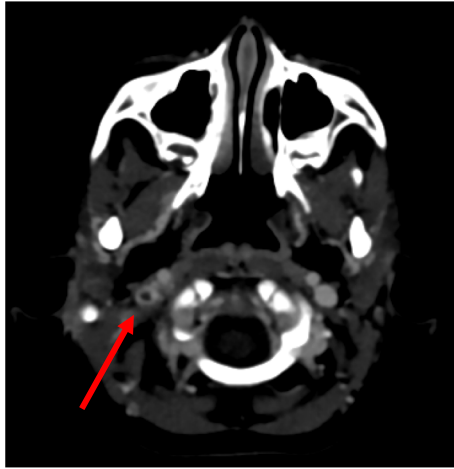


Complete recanalization – End of anticoagulation treatment

Evolution



Evolution



Clinical progress

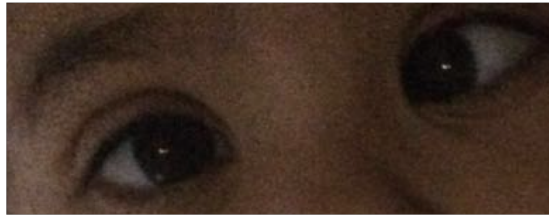
Normal hearing

Resolution of strabismus

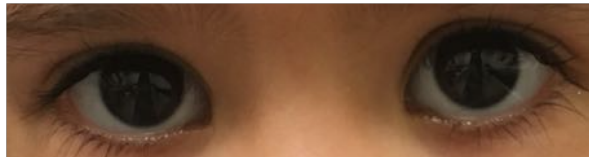
Absence of neurological sequelae

Clinical progress

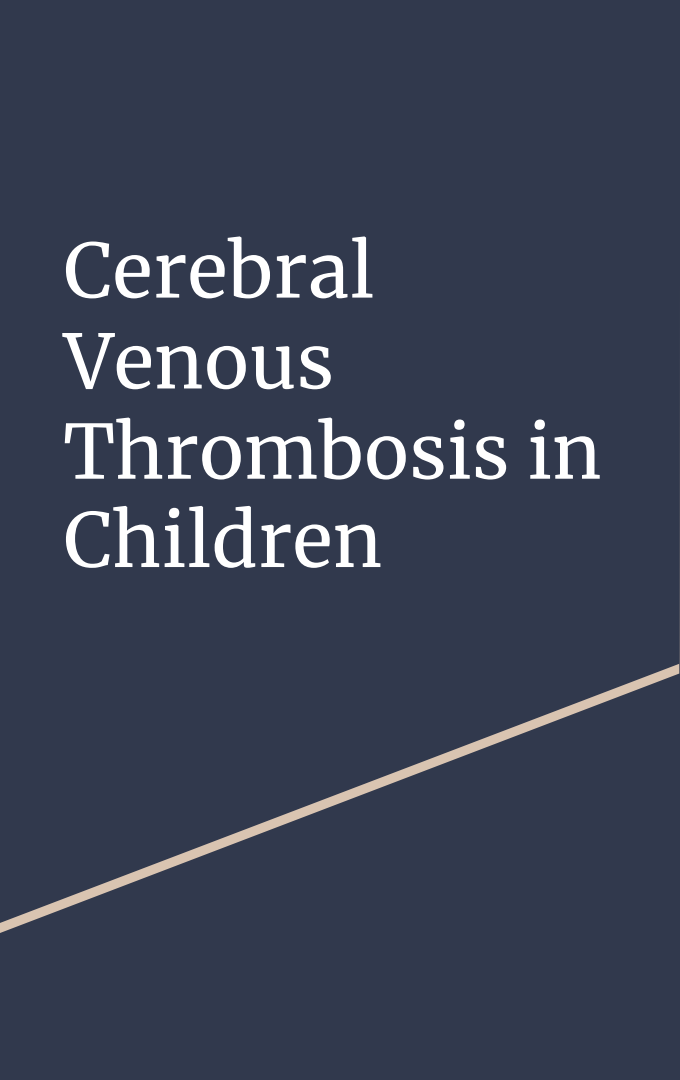
Before treatment



After treatment



Cerebral Venous Thrombosis in Children



Overall Aspects

- Rare condition in pediatric population
 - 0.34 - 0.67 cases/100.000/year
- Affects primarily neonates
- Results in neurologic impairment or death in approximately half the cases.
 - Occurrence of venous infarcts or seizures portends a poor outcome.
- Increase in diagnostic frequency due to more sensitive and safe radiological exams
- Greater clinical awareness of the condition necessary

- A predisposing factor is often present:
 - Infections, dehydration, anemia, fever, hypoxic-ischemic injury
 - Head and neck infections (otitis media and mastoiditis, meningitis, sinusitis)
 - Head injury, post intracranial surgery
 - Heart disease, nephrotic syndrome, malignancy
 - Drugs (corticosteroids, L-asparaginase, oral contraceptives)

Clinical features

- Different symptoms
 - Seizures
 - Depressed level of consciousness and coma
 - Nausea and vomiting
 - Headache
 - Visual impairment
 - Neurological deficits

- Neonates: seizures and diffuse neurologic signs

Diagnostic Imaging

- Diagnosis: lack of flow in the cerebral veins
- Methods of choice for investigation: CT venography or MRI with venography

Treatment

Anticoagulation

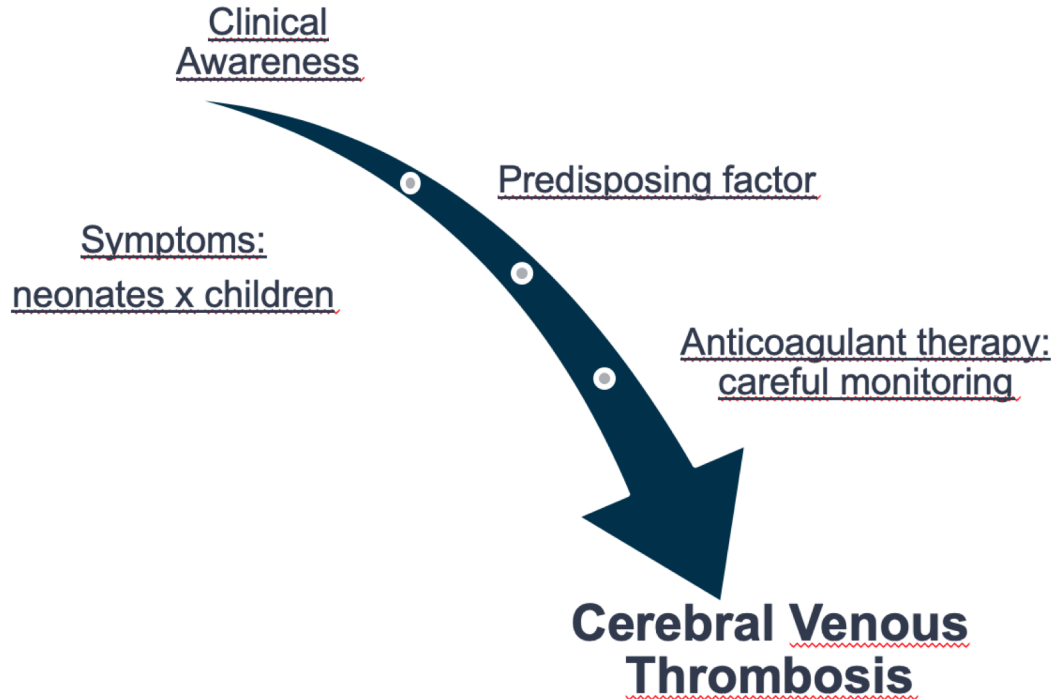
- Well tolerated by children and neonates (in the absence of any contraindication).
- During the acute phase, anticoagulation is probably effective in reducing the risk of death and sequelae.
- Anticoagulation is also effective in reducing the risk of recurrence.
- The duration of anticoagulation needs to be individually tailored. Prolonged treatment over 3-6 months is justified according to individual factors.

Treatment

Pre-treatment intracranial hemorrhage: requires more careful consideration

- The pathophysiology of hemorrhage in venous infarction involves venous/capillary hypertension and erythrocyte diapedesis or frank hemorrhage.
- By preventing new thrombus formation, anticoagulation enables unopposed fibrinolysis to dissolve thrombi, relieving venous congestion.
- Therefore, the potential ability of anticoagulant therapy to reduce intracranial hemorrhage caused by severe or persistent thrombosis may balance the risks of anticoagulant therapy dependent bleeding.

Keypoints



Discussion



References

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