SINUS AND VENOUS OCCLUSION

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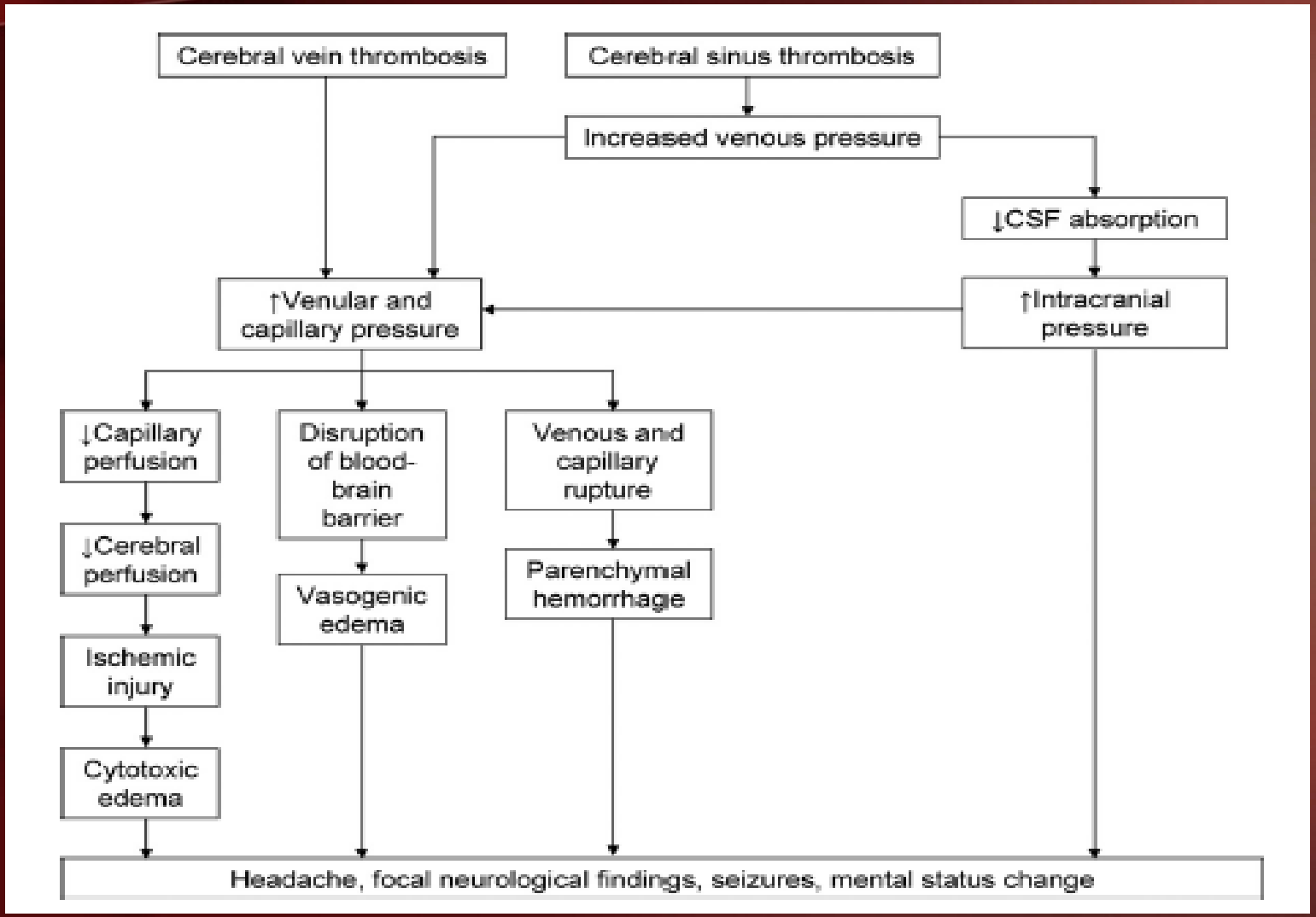
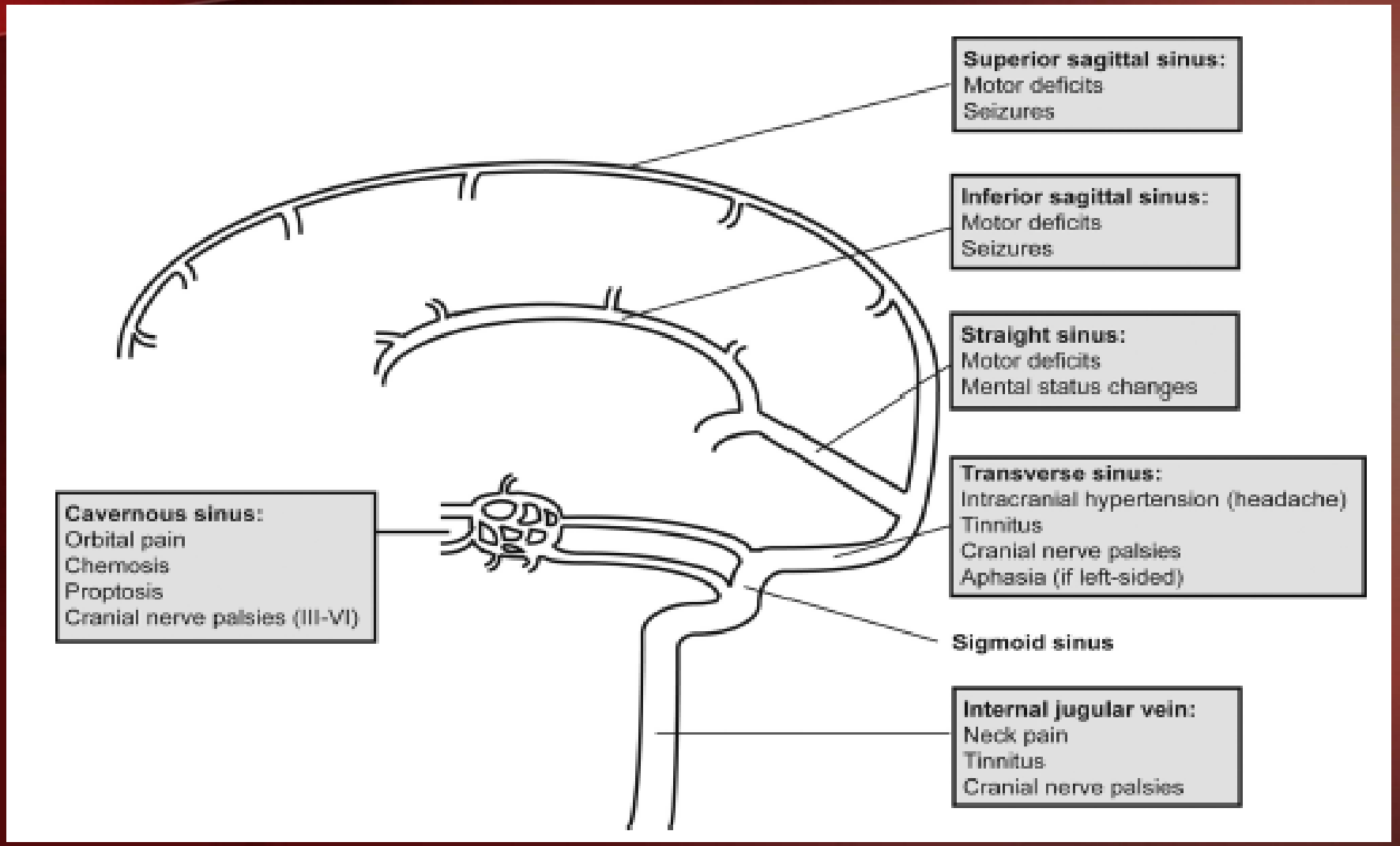
DURAL SINUS THROMBOSIS

- DST is an elusive, often under diagnosed cause of acute neurological deterioration
- Signs/symptoms may be nonspecific
- Causes: Pregnancy/puerperium, infection, dehydration, contraceptives, co-agulopathies, tumor, trauma
- Broad spectrum of nonspecific clinical findings
- High rate of morbidity and mortality (AJNR 1995)

PATHO-PHYSIOLOGY OF CVT



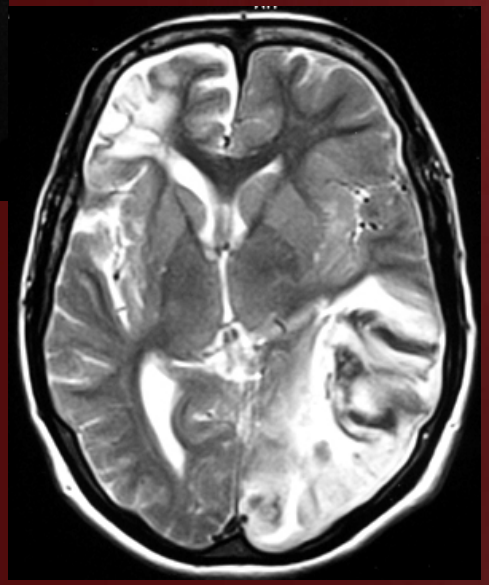
Clinical symptoms

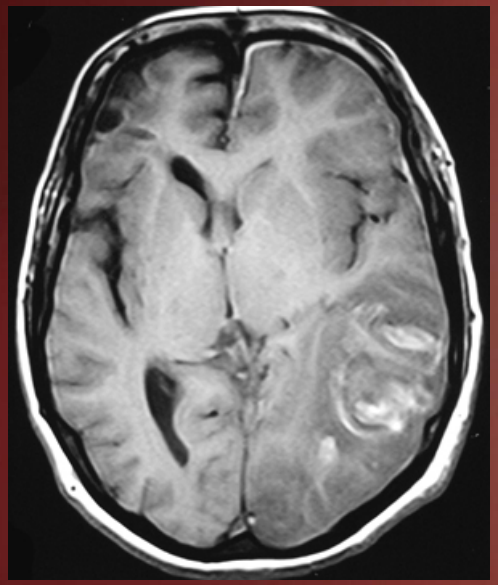


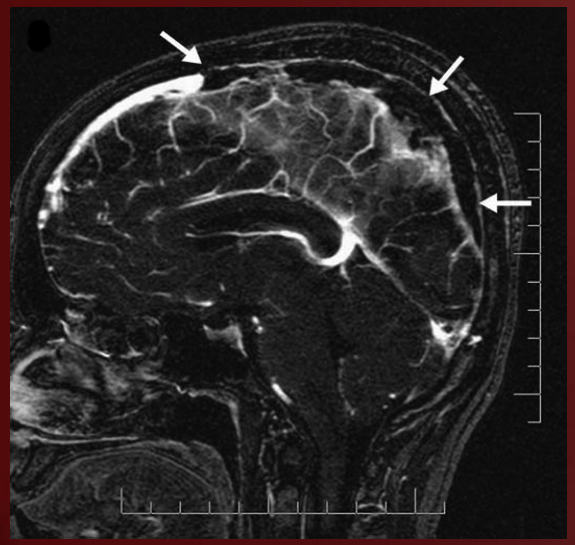
VENOUS INFARCTION: CONVENTIONAL MR FINDINGS

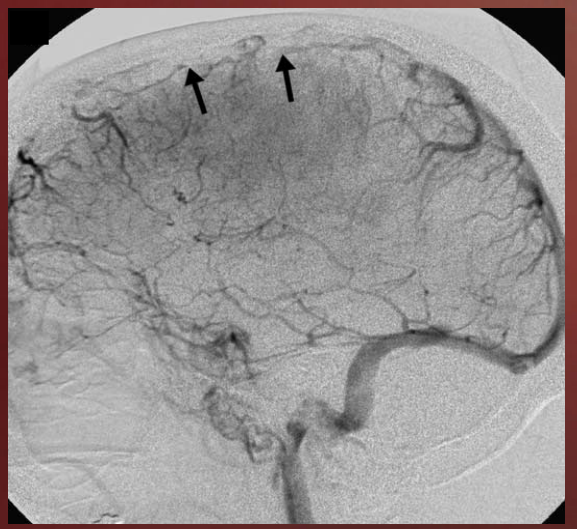
- Variable distribution
- Patchy lesions in white matter more than gray matter
- Commonly hemorrhagic
- White matter (gray-white junction) hematomas
- Identification of venous clot
- Pronounced mass effect and edema

VENOUS INFARCTION

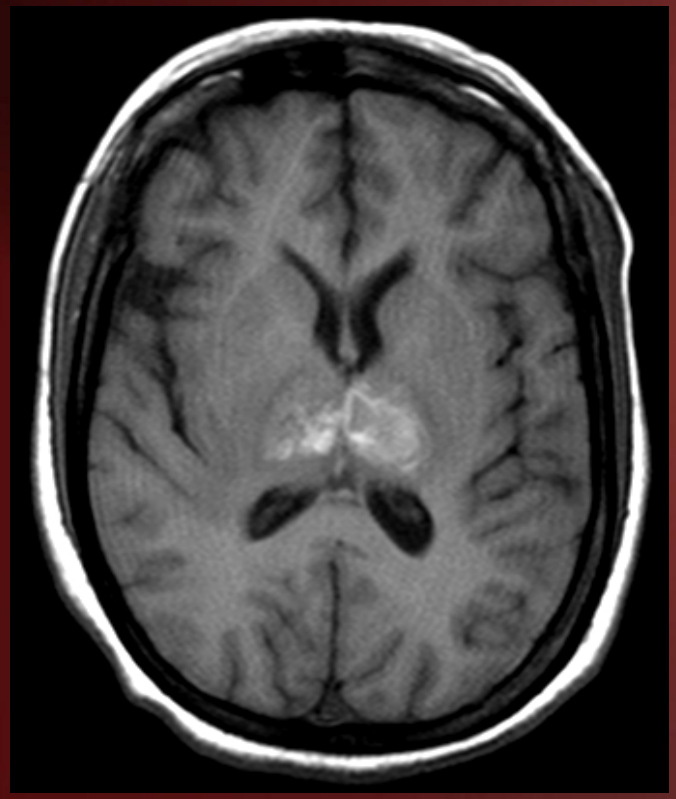


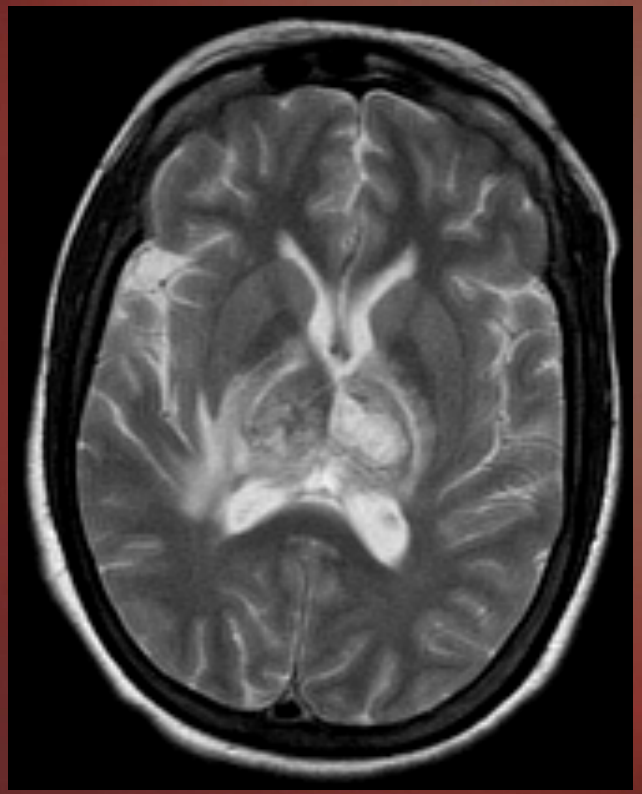




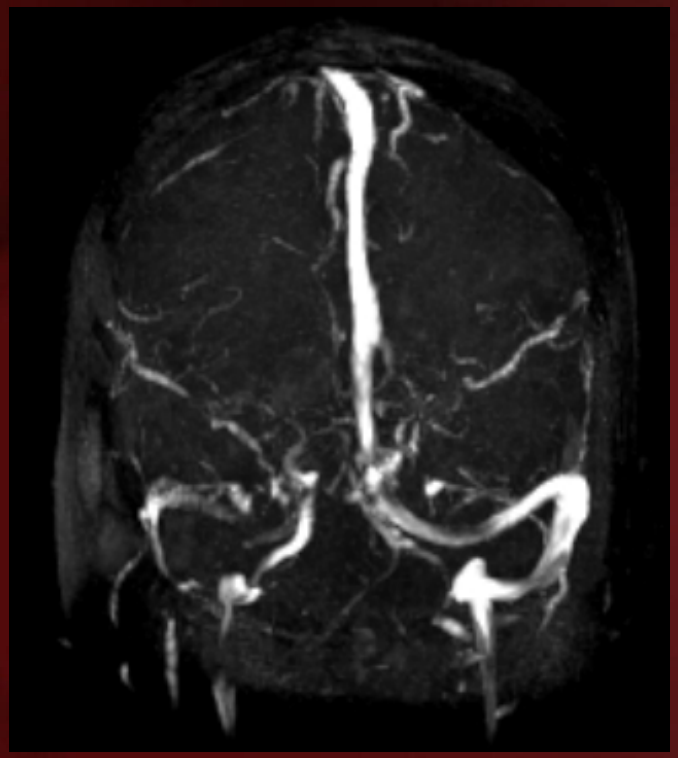


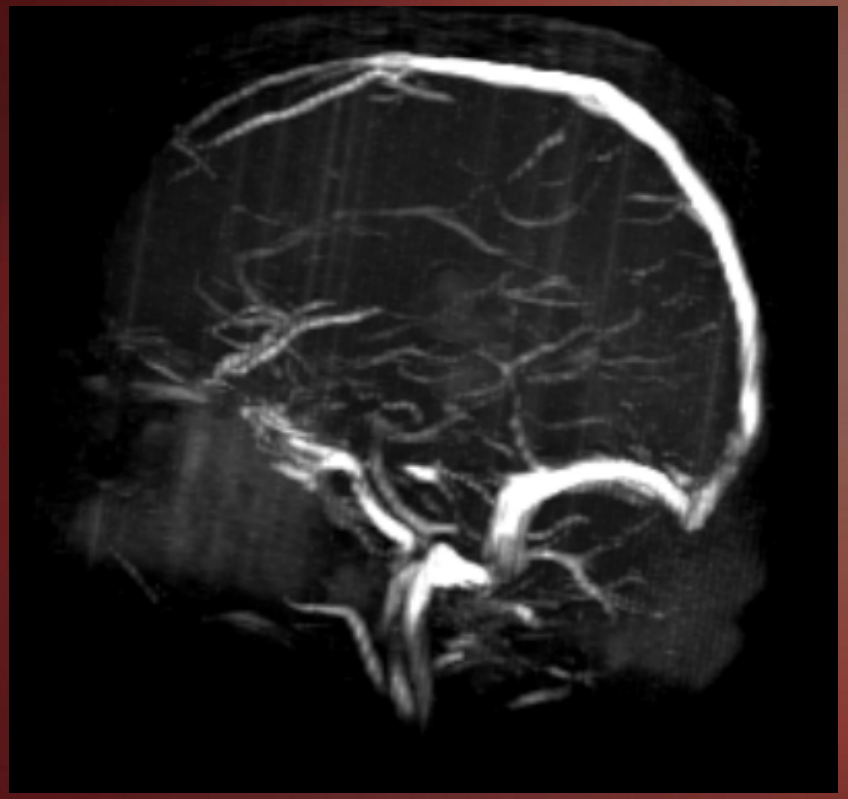
Deep venous sinus Thrombosis





Deep venous sinus Thrombosis





ANTI COAGULANTS IN CVT

RATIONALE FOR ANTICOAGULATION

- To prevent the extension of thrombus;
- To treat the underlying prothrombotic state;
- To prevent the recurrence of CVT.

WHY THERE IS A DILEMMA ??

- Fear of hemorrhage – 30-40% of patients have hemorrhage at the time of presentation .[1]

1. Ferro JM, Canhao P, Stam J, Bousser MG, Barinagarrementeria F. Prognosis of cerebral vein and dural sinus thrombosis: results of the International Study on Cerebral Vein and Dural Sinus Thrombosis (ISCVT). *Stroke. 2004;35(3):664-670.*

EVIDENCE FOR ANTICOAGULANT THERAPY

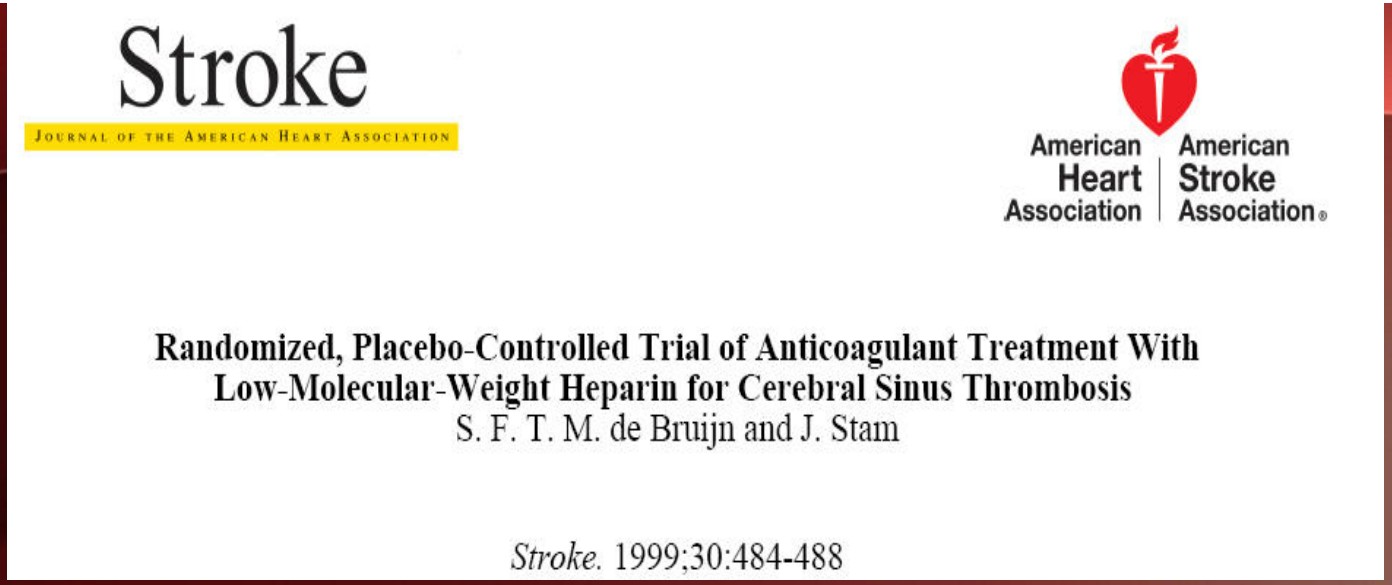
Lancet. 1991 Sep 7;338(8767):597-600.

Heparin treatment in sinus venous thrombosis.

Einhäupl KM[1], Villringer A, Meister W, Mehraein S, Garner C, Pellkofer M, Haberl RL, Pfister HW, Schmiedek P.

- Randomized double blinded placebo controlled trial
- 20 subjects were included
- After 3 months- Complete clinical recovery in 8 patients with heparin
  In the placebo group, only 1 patient had a complete recovery ($p<0.001$)
- Treatment outcome assessed by specially developed CVST severity scale .
- Limitations – 1.CVST severity scale not a validated scale in neurology

  2.Using death and dependency as clearly defined outcome parameters, the difference between the two groups would not be significant



- After 3 weeks- 20% in the nadroparin group and 24% in the placebo group had a poor outcome defined as death or Barthel Index score of < 15 , After 12 weeks, 13% vs 21%

- Favourable outcome more often than controls, but not statistically significant.

- Anticoagulation proved to be safe, even in patients with cerebral hemorrhage.

RISK OF HEMORRHAGE WITH ANTICOAGULANTS

- New intra cerebral haemorrhages occurred in 33 of 520 patients (6%) in the ISCVT STUDY.
- No symptomatic intra cerebral haemorrhages occurred after anticoagulant therapy in 40 patients in 2 RCT.
- Conclusion- Risk of intracerebral haemorrhage treated with anticoagulants is low.

THROMBOLYSIS IN CVT

- 9% to 13% have poor outcomes despite anticoagulation.
- Thrombolytic therapy is used if clinical deterioration continues despite anticoagulation.
- No RCT to compare thrombolysis with anticoagulation

Thromb Haemost. 2010 Nov;104(5):1055-62. doi: 10.1160/TH10-05-0311. Epub 2010 Sep 30.

Safety of thrombolysis in cerebral venous thrombosis. A systematic review of the literature.

Dentali F[1], Squizzato A, Gianni M, De Lodovici ML, Venco A, Paciaroni M, Crowther M, Ageno W.

ENDO VASCULAR INTERVENTIONS IN DURAL SINUS THROMBOSIS

- Methods of treatment still remain controversial
- Includes Endo mechanical thrombectomy ± thrombolysis
- Thrombolytic agents- Streptokinase/urokinase frequently used
- Significant risks of cerebral hemorrhage/systemic coagulopathy reported (Circulation 1985)
- Recombinant tissue plasminogen activator (rTPA) has been used.

Stroke. 2008 May;39(5):1487-90. doi: 10.1161/STROKEAHA.107.502658. Epub 2008 Mar 13.

Endovascular thrombectomy and thrombolysis for severe cerebral sinus thrombosis: a prospective study.

Stam J[1], Majoie CB, van Delden OM, van Lienden KP, Reekers JA.

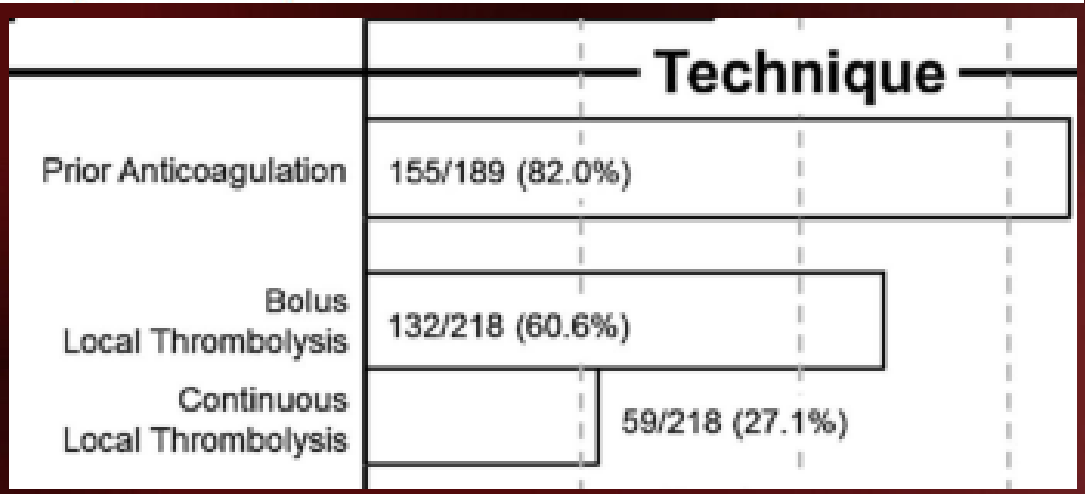
- ✓ Prospective case series
- ✓ 20 patients selected for thrombolysis after they were getting deteriorated with heparin
- ✓ Out of 20 , 15 pts also underwent thrombo suction.
- ✓ 12 pts had a good outcome, 6 pts died and 2 had a poor response.
- ✓ 5 pts who died had large hemispheric infarcts and edema before thrombolysis, causing herniation.
- ✓ 5 pts had increased cerebral haemorrhage (3 minor, 2 major) after thrombolysis.

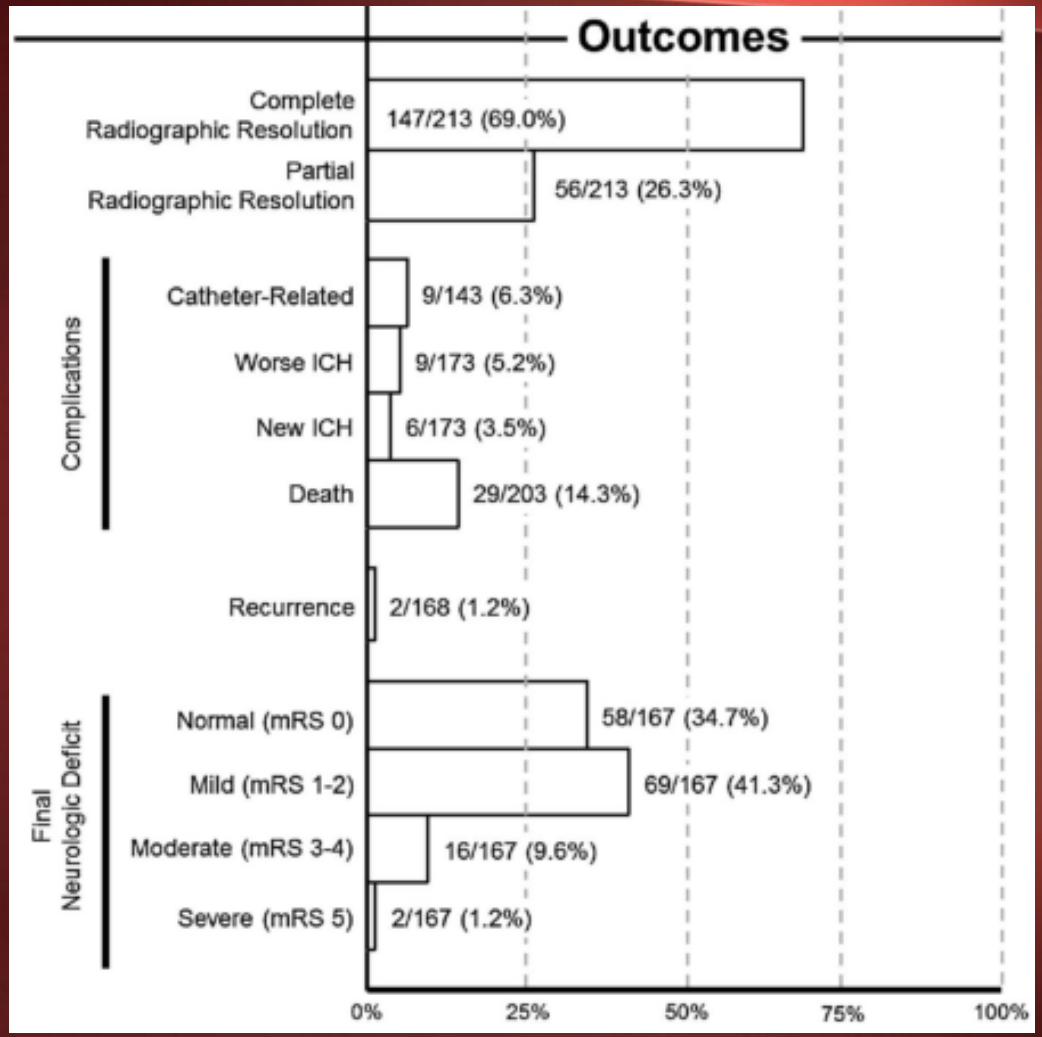
REVIEW

Endovascular mechanical thrombectomy for cerebral venous sinus thrombosis: a systematic review

Adeel Ilyas, Ching-Jen Chen, Daniel M Raper, Dale Ding, Thomas Buell, Panogiotis Mastorakos, Kenneth C Liu

J NeuroInterv Surg 2017;0:1–8. doi:10.1136/neurintsurg-2016-012938



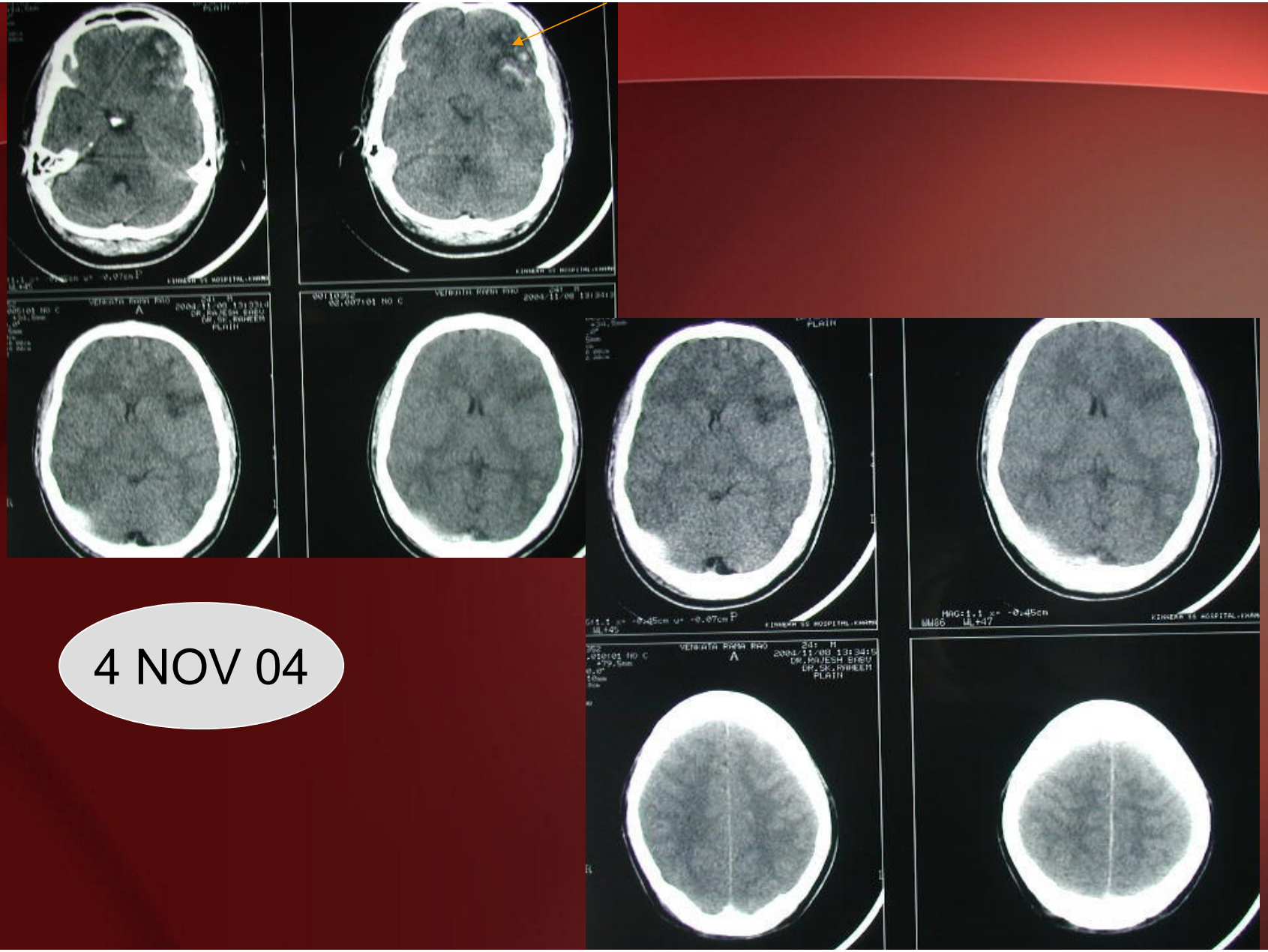


Thrombolysis or Anticoagulation in CVT (TO-ACT) trial is currently in the recruitment process (ClinicalTrials.gov NCT01204333) to investigate the functional outcomes of patients with severe CVST treated with endovascular thrombolysis.

ILLUSTRATIVE CASES

CASE 1

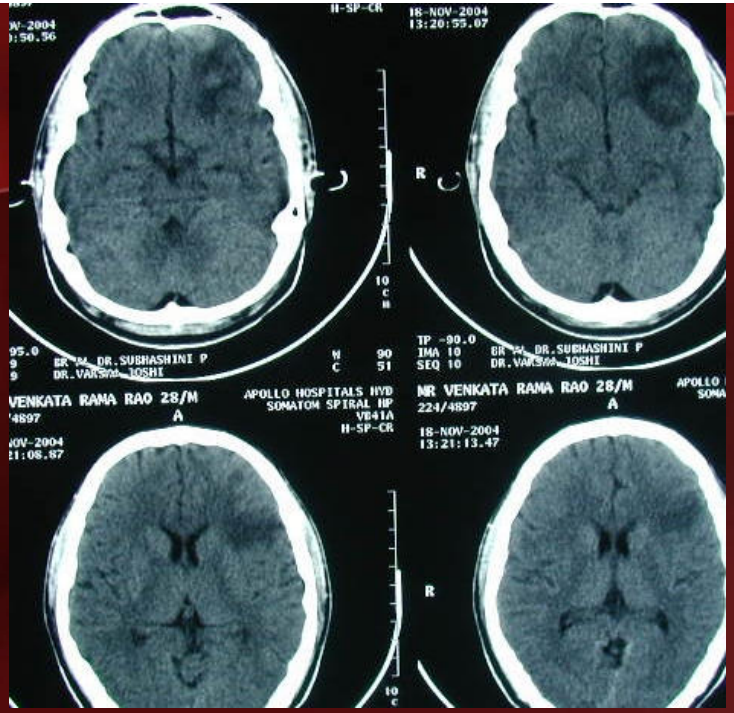
- 24 yrs man
- RTA on 4 Nov 04
- Scalp wound–sutured
- CT-showed left frontal contusion
- Headache
- Papilloedema



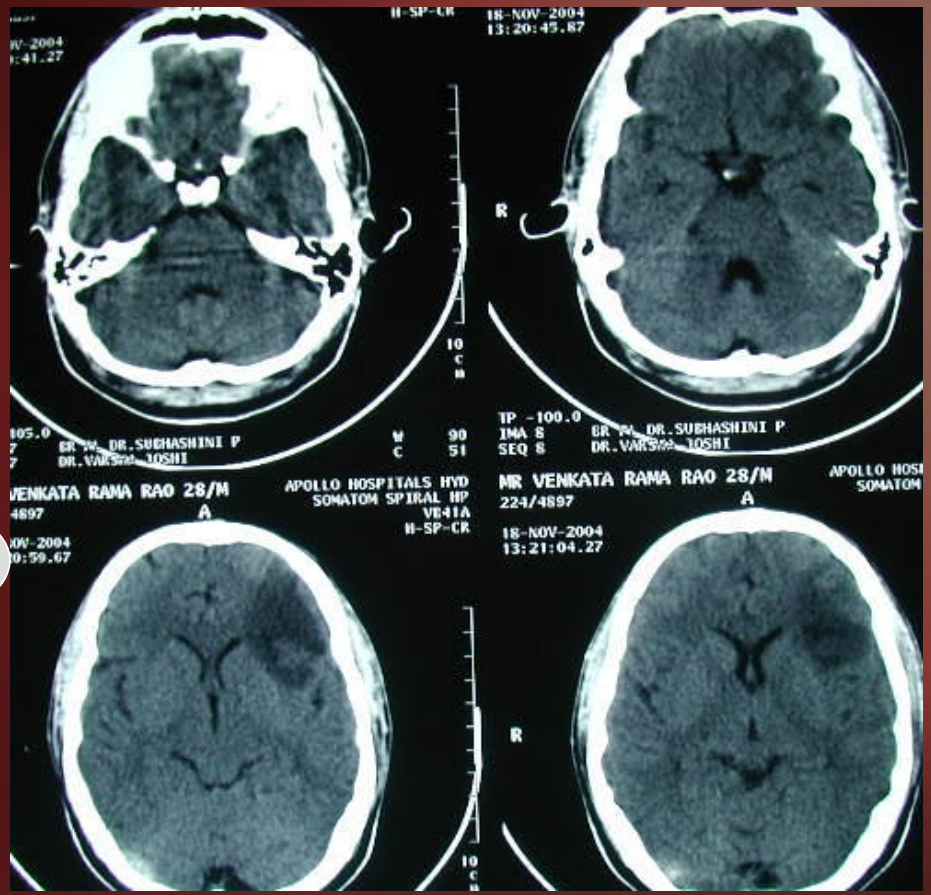
4 NOV 04

MANAGEMENT

- Started on heparin
- Vision decreased in both eyes
- Almost complete on right side
- On 17th Nov–local thrombolysis



POST THROMBOLYSIS CT



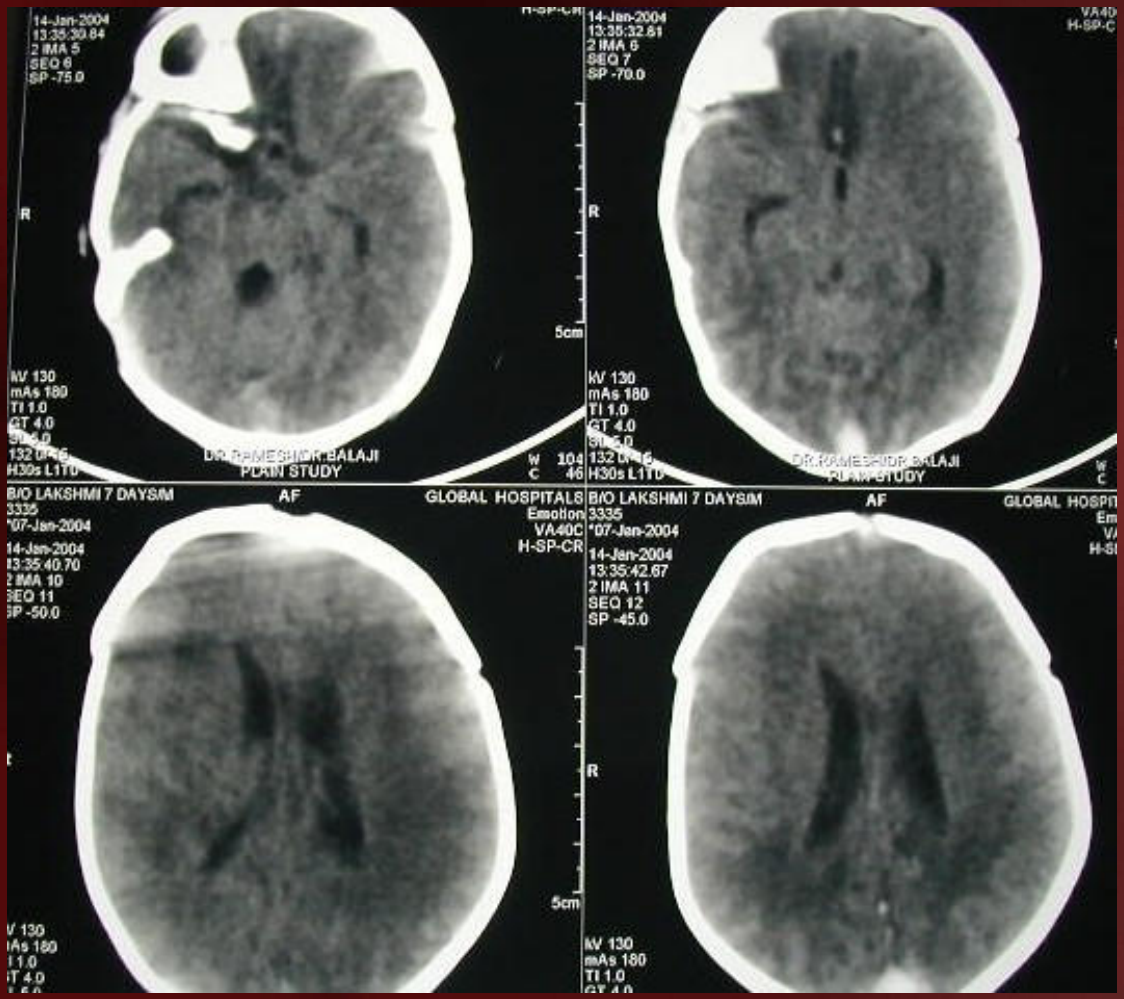
CASE 2

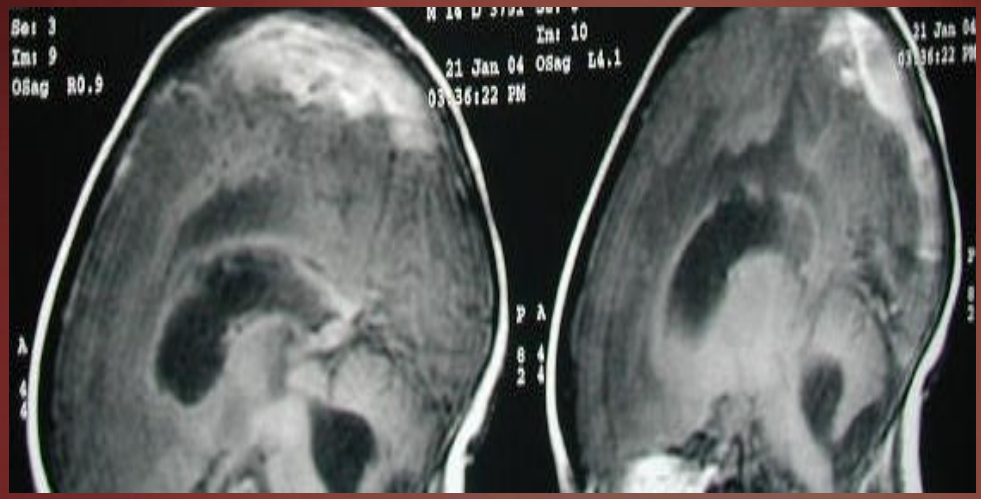
- MALE NEONATE APPARENTLY NORMAL AT BIRTH(JAN.2004)
- ON 4TH DAY DEVELOPED MULTIFOCAL TONIC CONVULSIONS
- CSF ANALYSIS-SUGGESTIVE OF MENINGITIS
- TREATED WITH ANTI BIOTICS AND ANTI CONVULSUNTS
- DEVELOPED APNEIC SPELLS
- TRANSFERRED TO NEONATAL CENTRE

AT ADMISSION

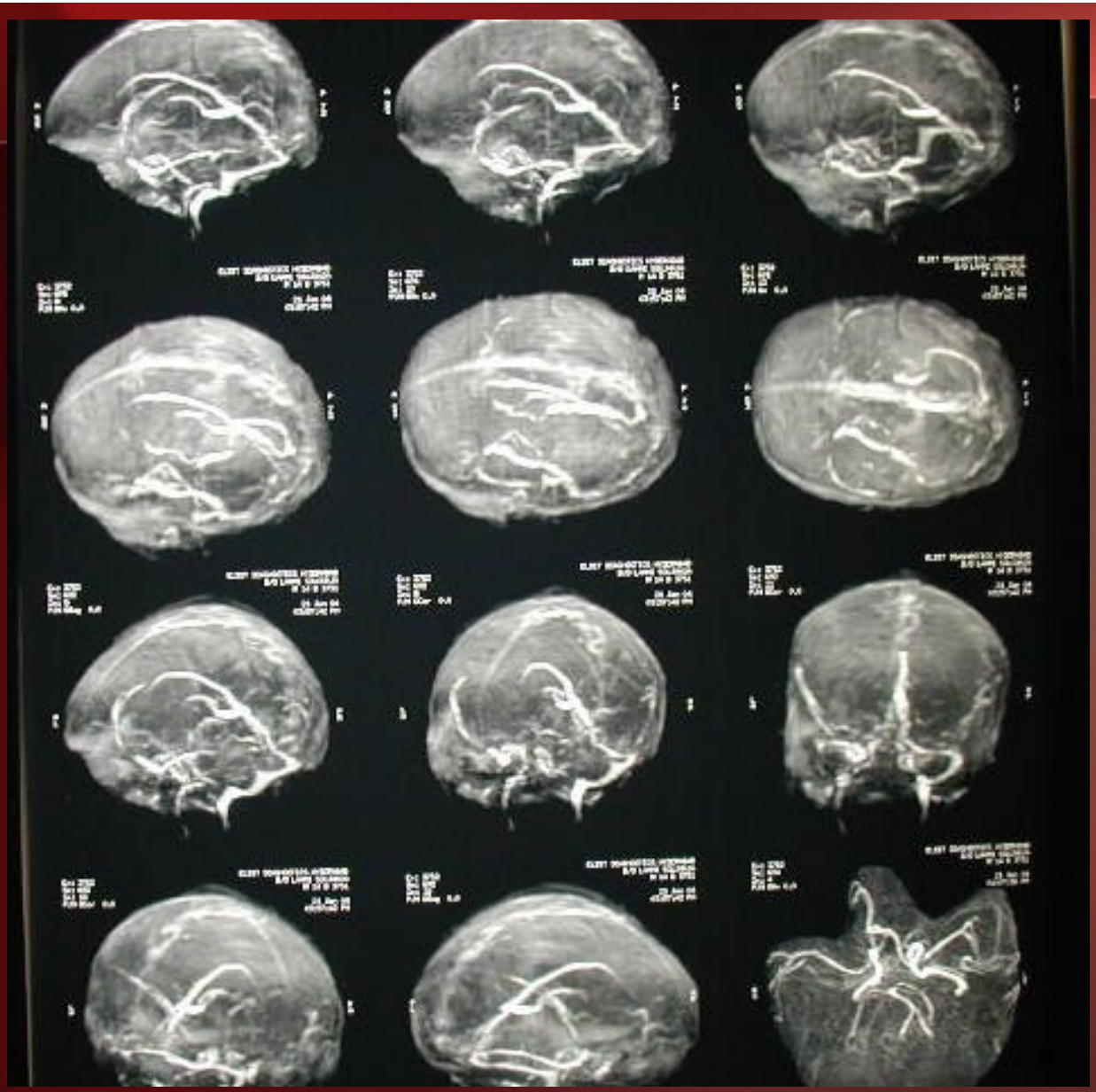
- HEMODYNAMICALLY STABLE
- 2-3 LITRES OF OXYGEN TO MAINTAIN SATURATION
- WEAK CRY
- ACTIVITY REDUCED
- NEONATAL REFLEXES DEPRESSED
- CONTINUED APNEIC SPELLS

CT BRAIN PLAIN





14 JAN 04

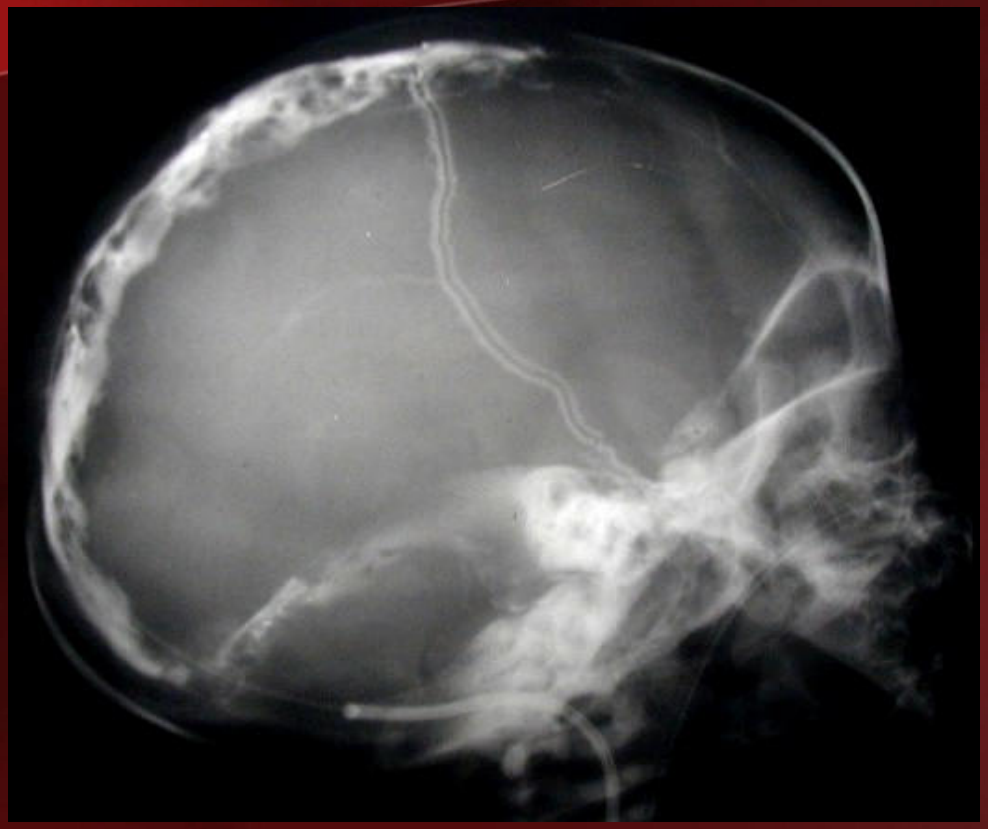


MANAGEMENT

- Heparin infusion
- Continued for 1 week
- No improvement

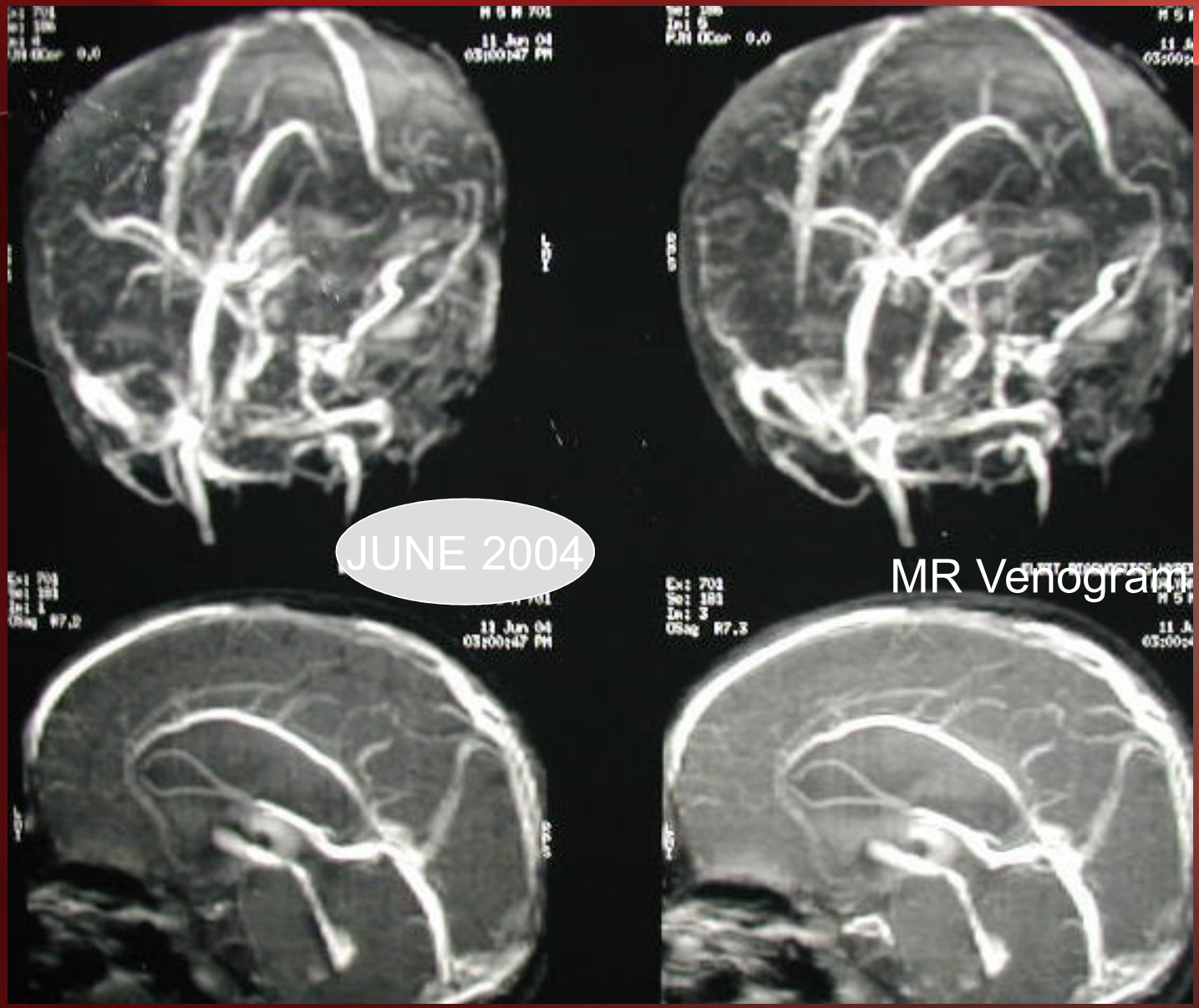
THROMBOLYSIS-TECHNIQUE

- Transfemoral approach
- Selective cannulation of lateral sinus and superior sagittal sinus
- Urokinase infusion 96 hrs
- 13,500/HR
- No complications



POST THROMBOLYSIS -48 HRS

POST THROMBOLYSIS -96 HRS

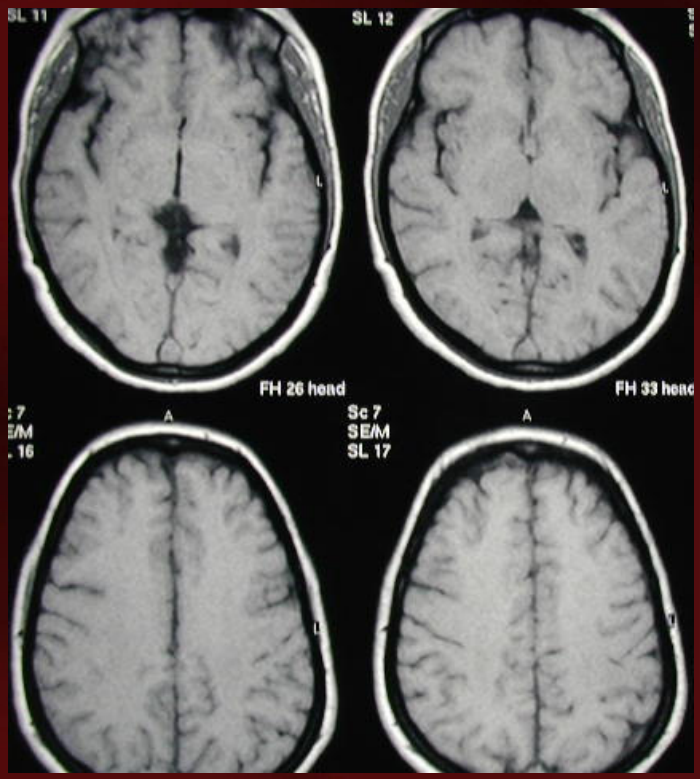

JUNE 2004
MR Venogram

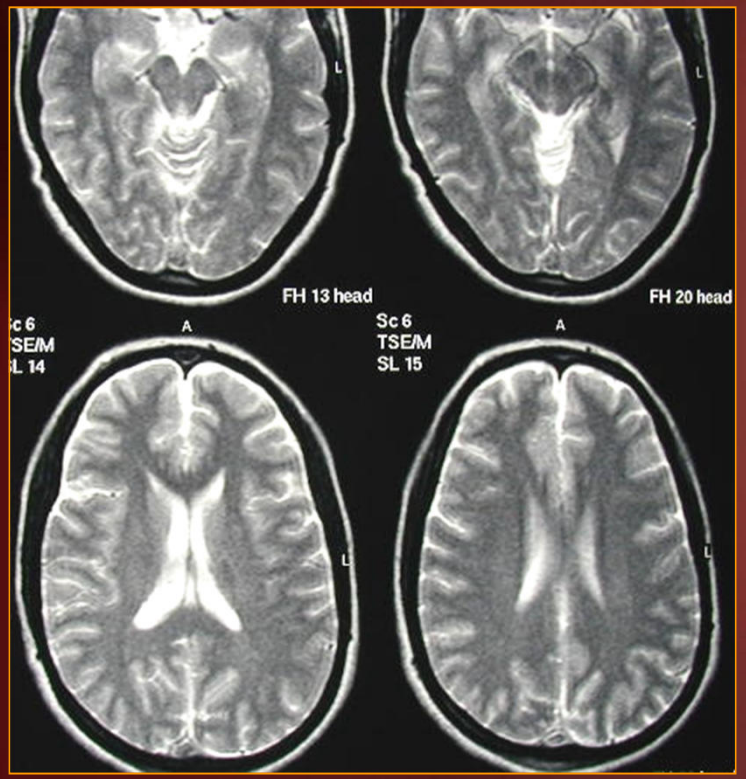
FOLLOW UP

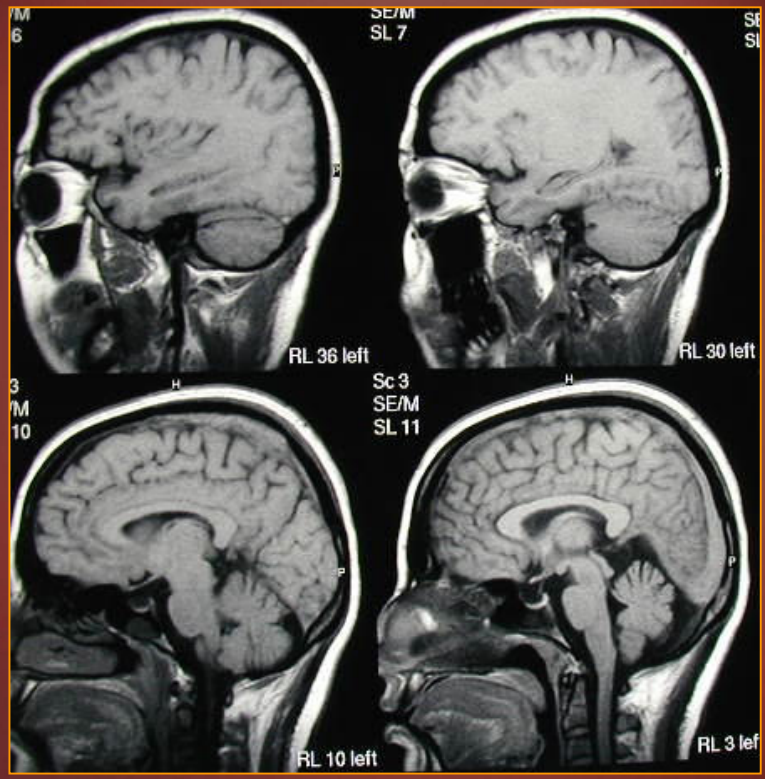
- LMWH continued till June
- Normal child except increased tone in right upper limb
- Hydrocephalus
- Shunt
- Improved

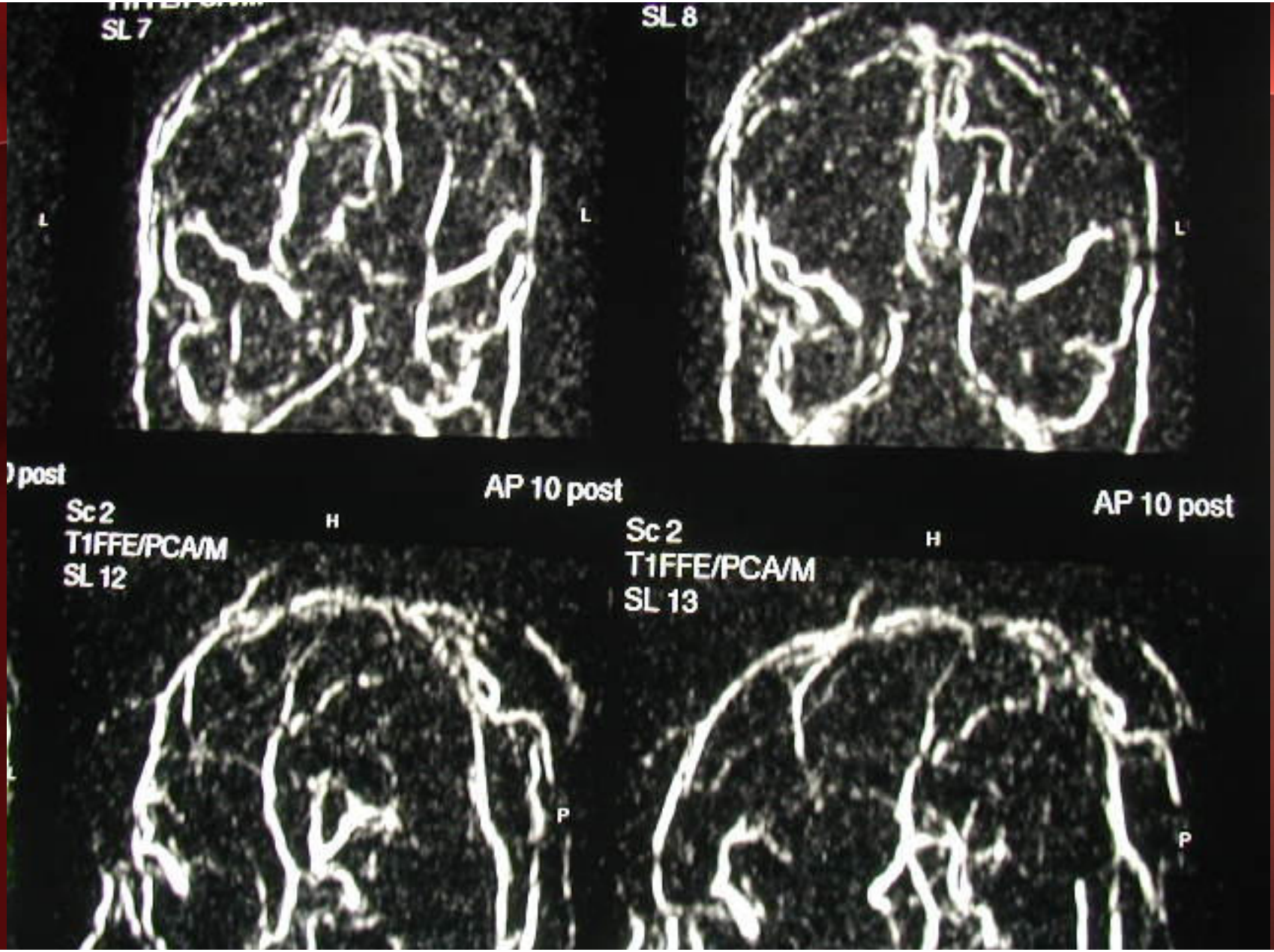
CASE 3

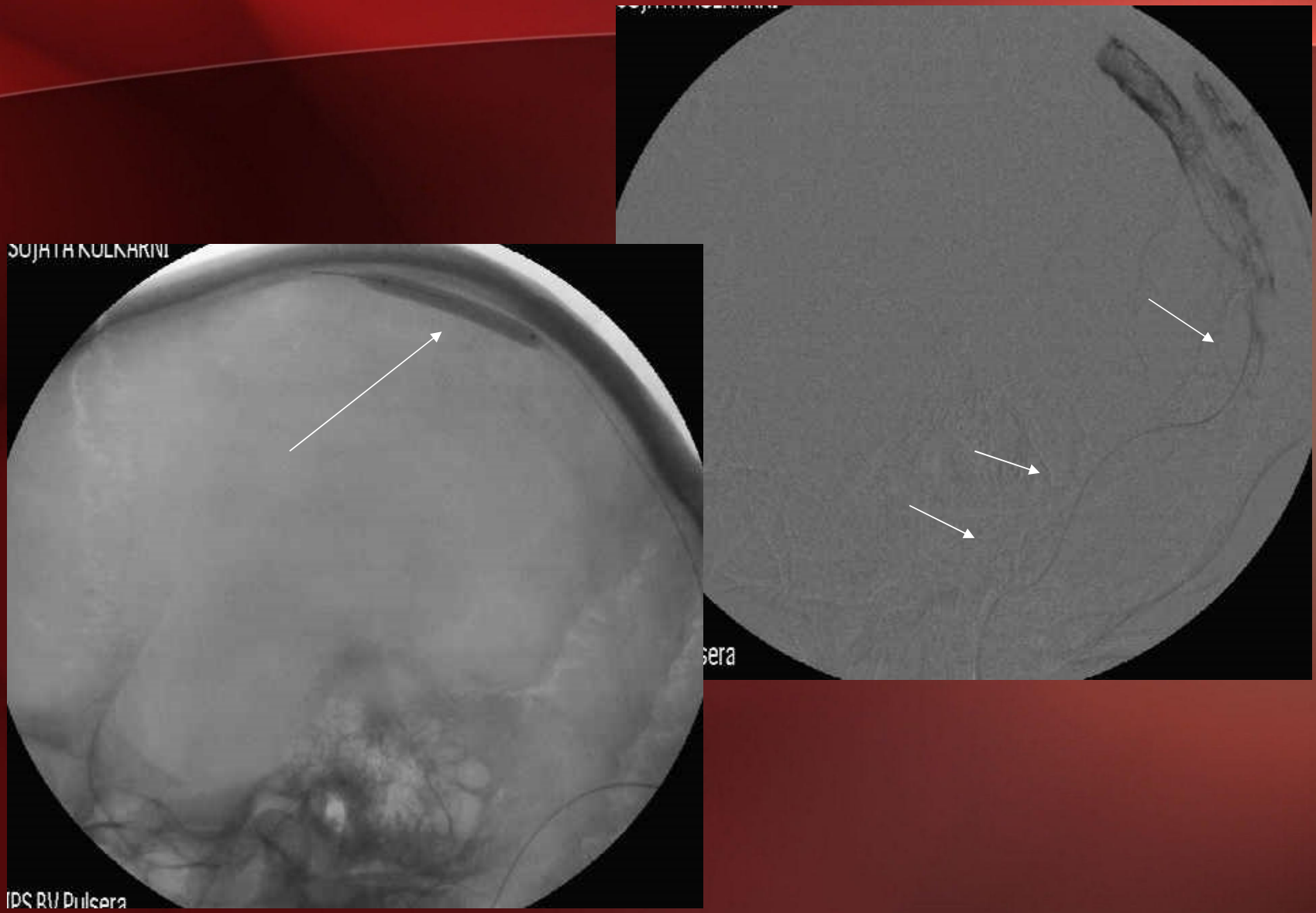
- 41 yr old woman
- Headache
- Severe papilloedema
- CT and MRI

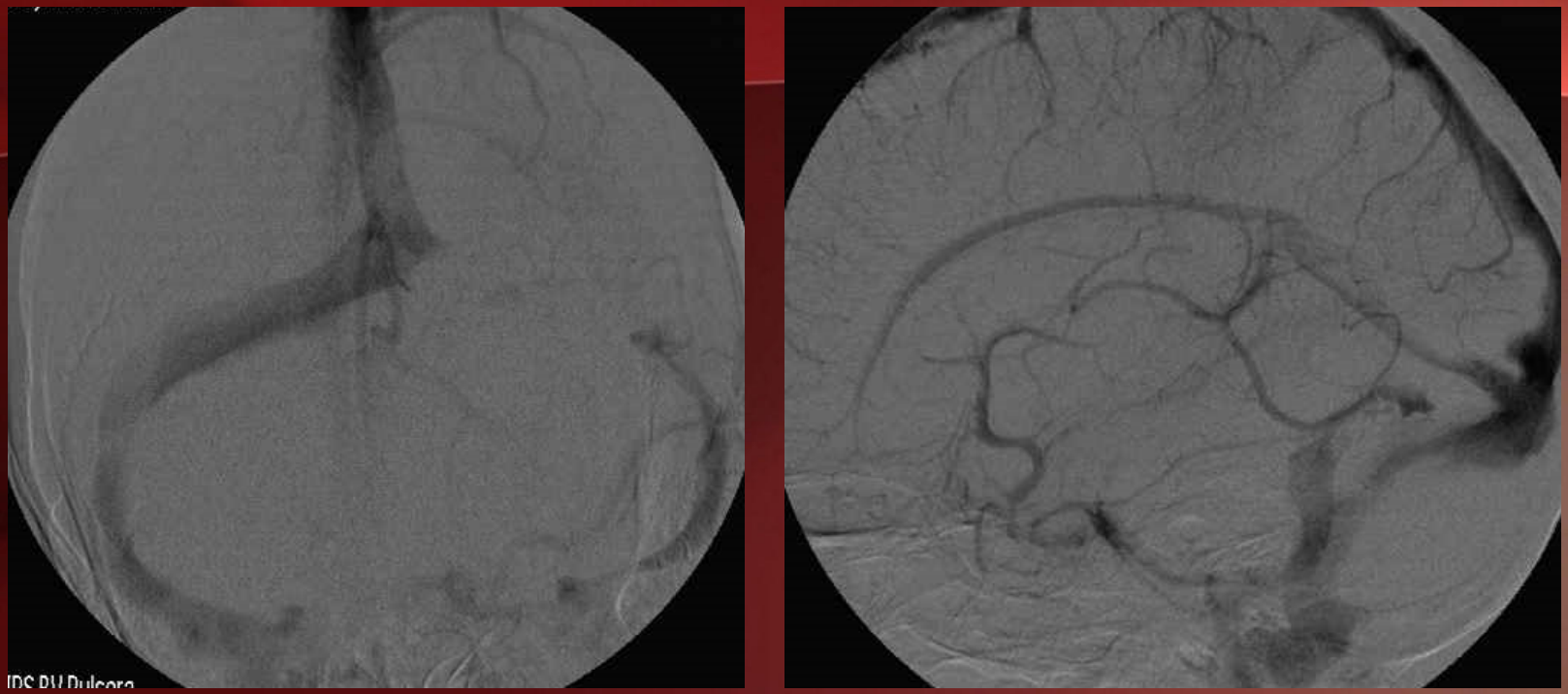

SL 11
SL 12
FH 26 head
FH 33 head
Sc 7
SE/M
SL 17


FH 13 head
FH 20 head
Sc 6
TSE/M
SL 15


SE/M
SL 7
RL 36 left
RL 30 left
Sc 3
SE/M
SL 11
RL 10 left
RL 3 left


SL 7
L
L
SL 8
L
post
AP 10 post
Sc 2
T1FFE/PCA/M
SL 12
H
P
AP 10 post
Sc 2
T1FFE/PCA/M
SL 13
H
P


SUJATA KULKARNI



72 HRS POST THROMBOLYSIS

TAKE HOME MESSAGE

- In the absence of more information from randomised trials we will need to base our treatment decisions on the limited information available.
- ***Anticoagulation with heparin is the only modality with reasonable evidence to support its use in CVT, even in patients with cerebral hemorrhage.***
- Endovascular thrombolysis is a promising option for patients with a severe form of CVT or following a failure of anticoagulation therapy.
- Mechanical thrombectomy is reserved for selected cases and decompression surgery for malignant CVT with impending herniation.