

CNS VASCULITIS IN CHILDHOOD

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- **ARUMS** (Ardabil University Of Medical Sciences)

11th annual IRA Congress

Tehran Iran 25.Oct.2017

CHILDHOOD PRIMARY ANGEITIS OF CNS cPACNS

- Early recognition,
 - Rapid diagnosis
 - and treatment of
-
- CNS vasculitis may prevent the devastating consequences associated with this disease.

HISTORY:

- In 1959, Cravioto and Feigin reported the first case of primary CNS vasculitis in an adult,

Adult PACNS is commonly diagnosed based on previously defined **Calabrese criteria** (1959) , including :

- **Newly acquired neurological deficit,**
- Angiographic or histologic evidence of CNS vasculitis,
- **And in the absence of a systemic condition associated with these findings**

- Although such criteria have not been established in children,
- **Childhood** PACNS (**cPANCS**) is commonly diagnosed based on the same measures.

- **The pathogenesis:** of cPACNS and PACNS remains unclear. cPACNS is an inflammatory brain and spine disease.
- As in many inflammatory diseases, research is
- focusing on two major areas:
- **trigger mechanisms** and **host susceptibility**.
- Infections are potent triggers of inflammatory responses.

- **Animal models** document that expression of the human TNF- α p75 receptor on astrocytes can trigger endothelial cell activation, ultimately vessel fibrosis.
- Case reports imply that treatment of suspected multiple sclerosis with interferon- β is associated with the development of CNS vasculitis and stroke.

- Primary angiitis of the central nervous system of childhood (**cPACNS**) is:
- a some extent reversible cause of severe neurological impairment, including

- ❖ *Acute ischemic stroke,*
- ❖ *Intractable seizures and*
- ❖ *Cognitive decline.*
- ❖ *Behavior changes*

- Primary angiitis of the central nervous system of childhood can be divided into
 - large–medium vessel and
 - small-vessel vasculitis,
- each presenting with distinct clinical and radiological features.

large-vessel inflammation with subsequent focal stenosis is the hallmark of **cPACNS**.

The majority of NP-cPACNS patients present with **stroke**:

- **Stroke** features including:

- ☐ Hemiparesis,
- ☐ Hemifacial weakness,
- ☐ Hemisensory loss

cPACNS patients with **distal and Small vessel stenoses** often present with significant **diffuse neurologic deficits** including :

- ❑ Cognitive decline
- ❑ Behavior changes,
- ❑ School difficulties, and
- ❑ Mood/personality changes.

The most common presenting of cPACNS features are:

- ❖ **Severe headaches**
- ❖ **Stroke features.**

- **Laboratory tests :**

Systemic inflammatory markers are frequently normal:

(**ESR**), (**CRP**), (**WBC**), **C3** complement,

Ig G level by no means exclude an active vasculitic process in the CNS.

- ❑ Some children may have **positive** (ANA)
- ❑ (**ANCA**) are usually not detected.
- ❑ Low titer **anticardiolipin antibodies** may be found in up to 50% of patients (Adult)

- **CSF** inflammatory markers are either

- **pleocytosis** and/or

- raised CSF **protein**.

- CSF analysis is an essential part of the diagnostic evaluation of cPACNS patients, not only to determine cell counts and protein levels, but also to exclude active CNS infections.

MRI :

lesions in cPACNS may be

- unifocal or multifocal
- unilateral or bilateral.
- involving both grey and white matter.
- supratentorial (98%)

☐ **MRA of Arteries show:**

☐ Stenosis

☐ Multiple micro-aneurysms

☐ Abnormal straightening and kinking

- **Biopsy**

- brain and leptomeninges:

is considered the **gold standard** for the diagnosis of PACNS in adults.

Prognosis:

- A complete neurologic recovery was in only 34% of patients at a mean follow-up of 20 months.
- Significant neurologic deficits were found in 45% of NP-cPACNS patients and 31% of P-cPACNS patients .
- The recovery of SV-cPACNS patients appears to be more encouraging.

Table 1. Differential diagnosis of primary CNS vasculitis in children

Systemic diseases associated with secondary CNS vasculitis	
Infections	Viral: Varicella zoster, HIV, Hepatitis C, Parvovirus B19 Bacterial: <i>Borrelia</i>, tuberculosis Fungal: <i>Aspergillus</i>
Systemic vasculitis	Polyarteritis nodosa Microscopic polyarteritis nodosa Wegener's granulomatosis Takayasu's arteritis
Collagen vascular diseases	Systemic lupus erythematosus Behçet's syndrome Dermatomyositis Sjögren's syndrome
Inflammatory diseases	Inflammatory bowel disease Post-strep glomerulonephritis
Malignancy	Neoplasm Graft versus host disease
Noninflammatory vasculopathies and mimics of CNS vasculitis	
Primary vasculopathies	Migraine/vasospasm Moyamoya disease Fibromuscular dysplasia
Secondary vasculopathies	Hemoglobin disorders (sickle cell disease, thalassemia) Thrombi/emboli Metabolic diseases: MELAS Antiphospholipid antibody syndrome
Vascular injury	Dissection Radiation
Drugs	Amphetamines Contraceptives

CNS—central nervous system; MELAS—mitochondrial myopathy, encephalopathy, lactacidosis, stroke.

Childhood Primary Angiitis of CNS, Ten Years' Experience in a Pediatric Rheumatology Clinic

Abstract

Background: CNS vasculitis in children as a primary vascular inflammatory process is considered a novel clinical problem in pediatric rheumatology clinics.

Methods: From 1996 to 2016 at pediatric rheumatology clinic, patients < 18 years of age were included to this study as having childhood primary angiitis of CNS (cPACNS). Including criteria were: clinical diagnosis of primary CNS vasculitis, and MRA findings demonstrating aneurism and or arterial stenosis not attributable to other causes.

Results: 22 patients were enrolled with mean age 10 years, (54%) were female. Headache was in (88%) then mental disorder and seizure in (45%) were the most common neurologic symptoms. The mean delayed to diagnosis was 4 years. Fever was in (54%) and ANA in (31%) was positive. 63 % had abnormality in both MCA and ACA (14 patients), whereas PCA showed abnormality in 36% (8 patients). 86 % had normal EEG results. 22% suffered from severe and permanent neurological damage.

Conclusion: Since cPACNS is unfamiliar and rare disorder, we recommend that in any patient with unexplained neurologic symptoms such as headache, seizure and mental disorder, CNS vasculitis should be considered as a probable background.

Keywords: CNS Vasculitis; CNS Angiitis; Brain MRI; Brain MRA

Citation: Farhad Salehzadeh., et al. "Childhood Primary Angiitis of CNS, Ten Years' Experience in a Pediatric Rheumatology Clinic". *EC Paediatrics* 4.2 (2017): 49-55.

Symptoms and signs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
Headache	+	+	+	+	+		+		+	+		+	+		+	+			+	+	+		15
Seizures	+	+			+					+	+		+			+			+	+		+	10
Visual Problems			+							+			+										3
Motor Problems					+							+	+	+			+						5
Personality and mood Changes	+	+			+	+		+				+					+					+	8
Dysarthria	+				+	+		+									+	+				+	7
Concentration difficulties		+	+			+						+						+		+		+	7
Mental disorder				+	+	+		+				+	+				+	+		+		+	10
Weakness				+	+					+	+		+						+			+	7
Fever	+		+	+	+					+	+		+	+	+	+				+		+	12
Decreased Energy level	+	+			+				+	+	+		+				+			+		+	10
Weight loss	+			+			+					+	+	+						+			7
Loss of appetite	+				+					+				+	+				+	+			7

Table 1: Patients' symptoms and signs.

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loss of appetite	+			+					+				+	+					+	+			7
weight loss	+			+			+					+	+	+						+			7

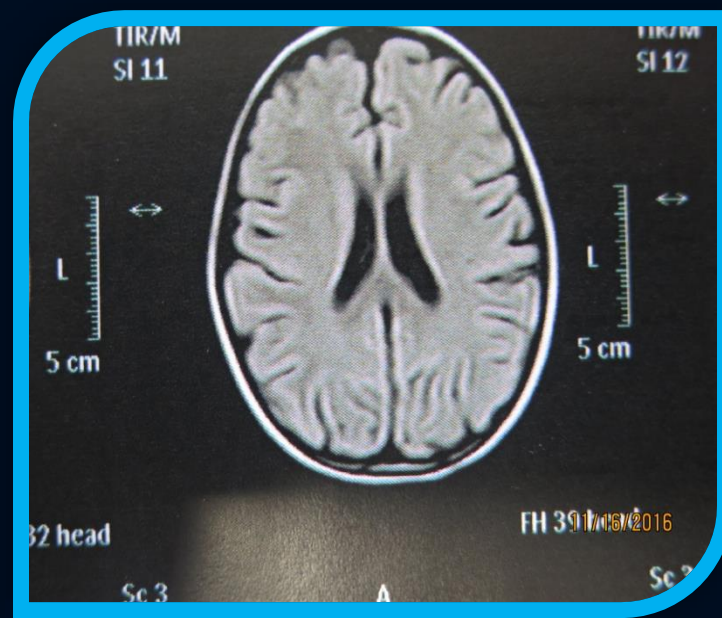
MRI Findings	MRA Findings
Mild cerebral atrophy with subarachnoid space dilatation	Microaneurysms can be seen in the MCA, distal branches of the right and left middle cerebral artery
Ventricular dilatation	Microaneurysms in ACA and MCA
Evidence of peri- ventricular WM foci with special involvement of occipital area	There are beadings in cerebral Arteries in Anterior and Posterior Vessels
Mild hydrocephaly and Occipital Lobe atrophy	There is microaneurysm at PCA and MCA
White matter lesions	Microaneurysms are seen at MCA and ACA. Left ACA is derived from Anterior Communicating Artery.
Small focal lesions with fluid intensity signal in right	There are beadings in cerebral Arteries in Anterior and Posterior circulation and Willis Circulation. (ACA, PCA) No evidence of arteriovenous Malformation and blockage is seen.

Table 3: Comparison of MRI and MRA findings.

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	arteriovenous Malformation and blockage is seen.
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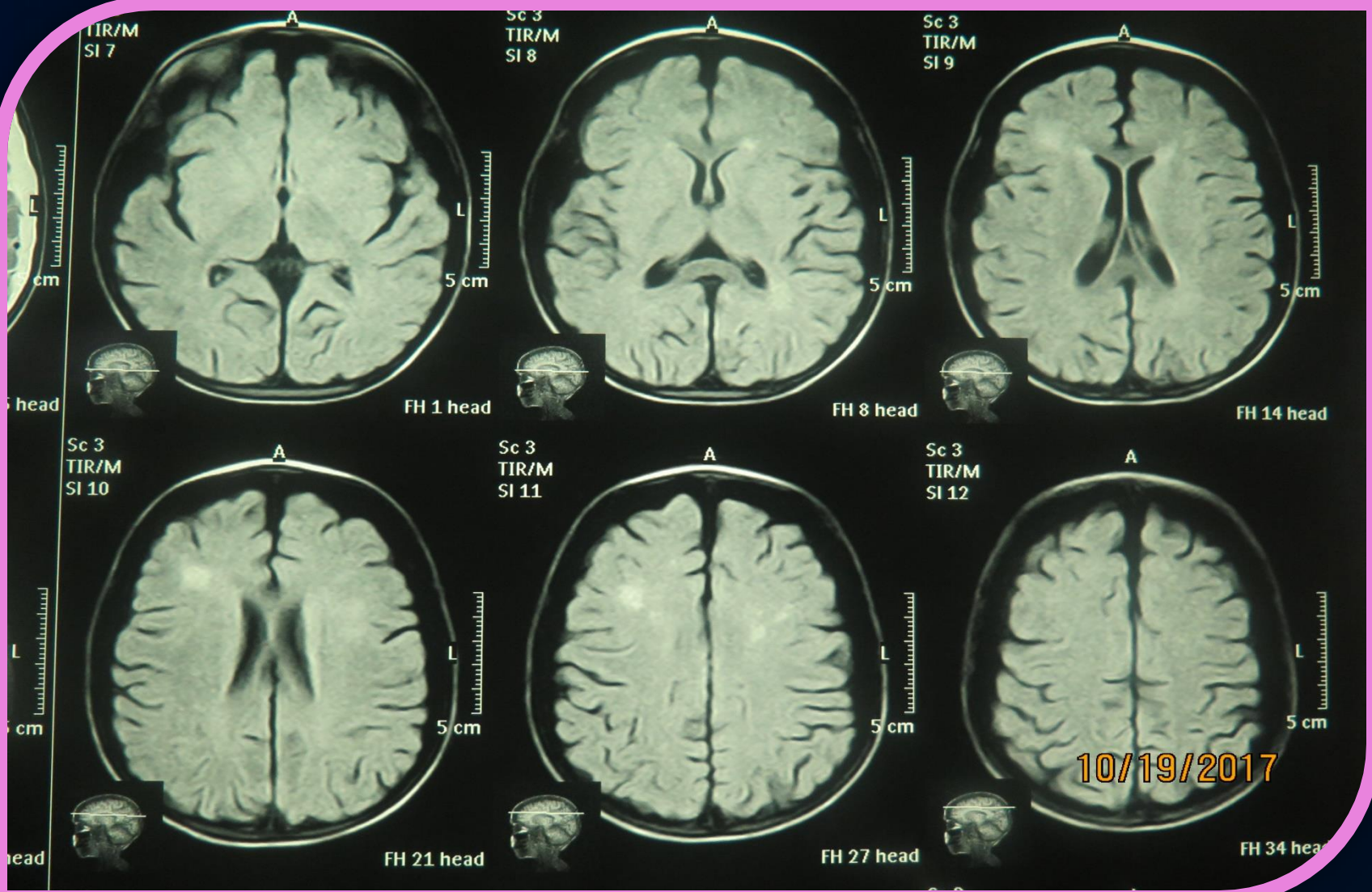


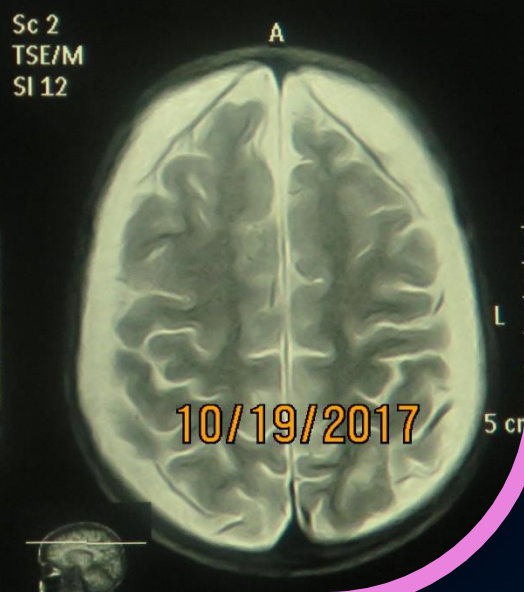
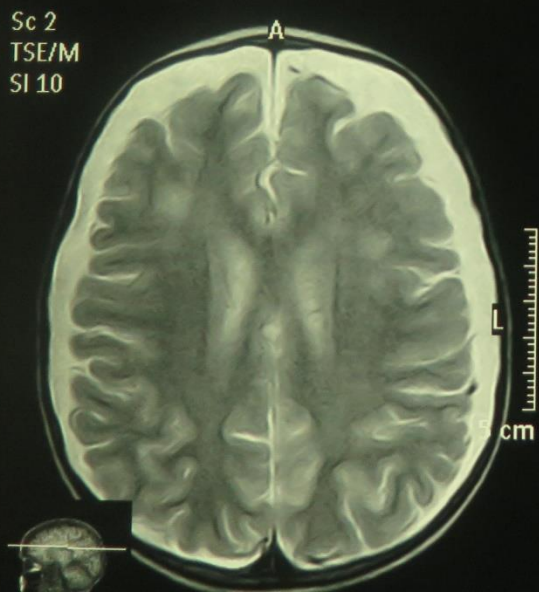
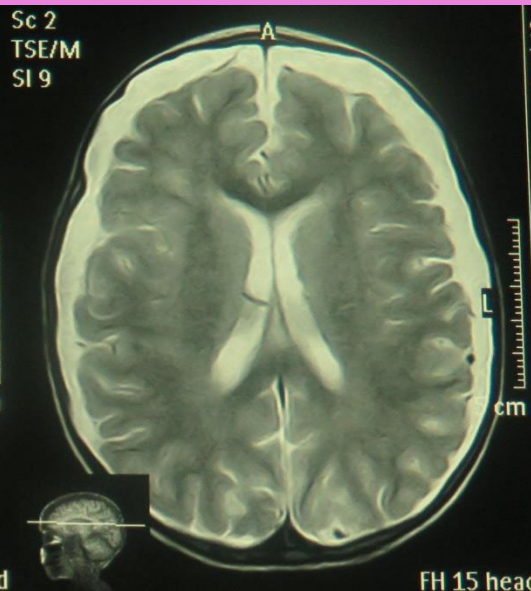
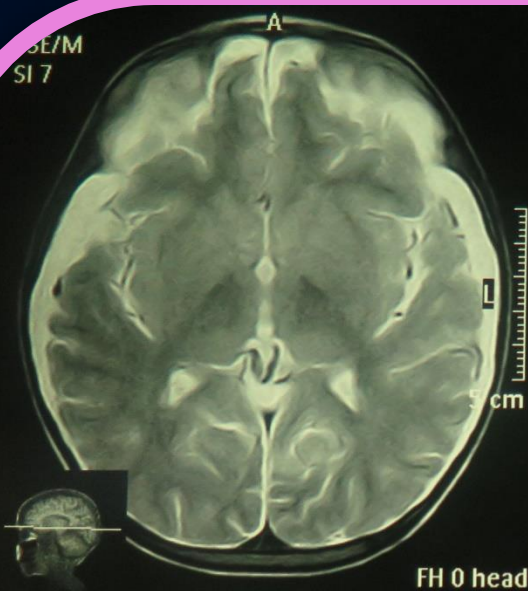




BY PARENTS PERMISSION:

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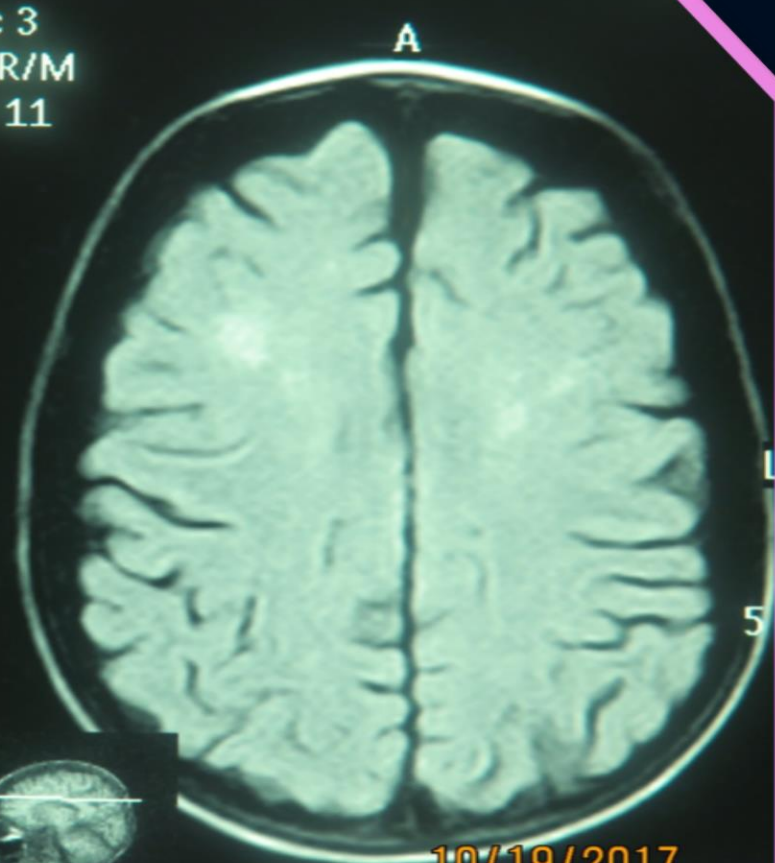
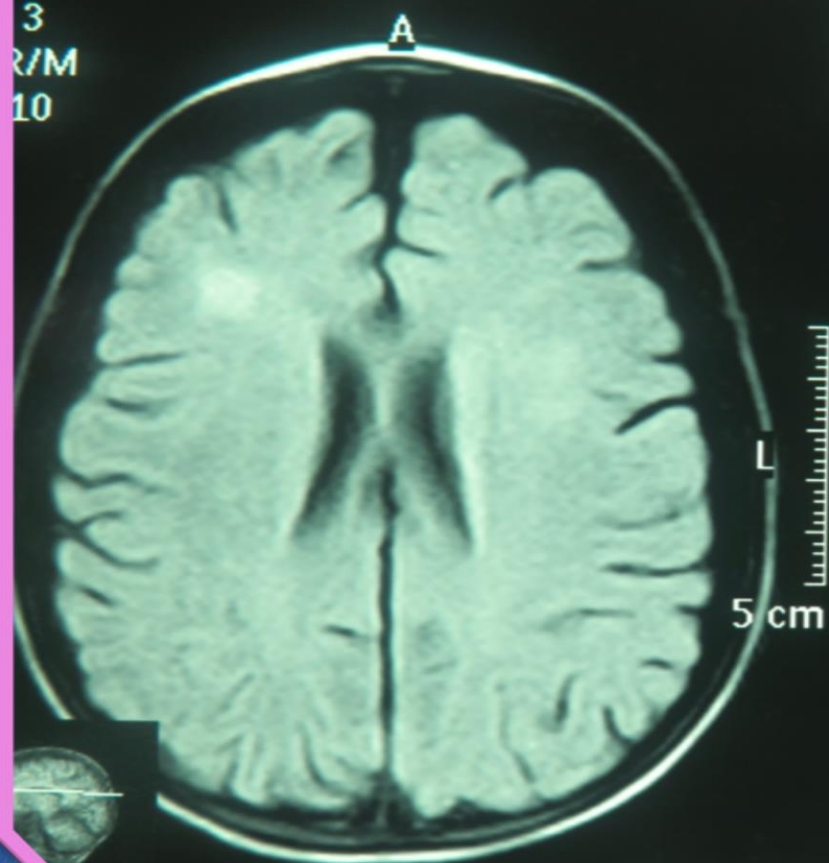




FH 1 head

3
R/M
10

Sc 3
TIR/M
SI 11



FH 21 head

10/19/2017

FH 27 h

A

Sc 3

A

SI 10

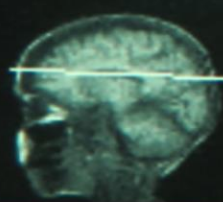
SI 11

L

5 cm

L

5 cm



10/19/2017

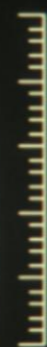


FH 21 head

Sc 2
TSE/M
SI 10

A

Sc 2
TSE/M
SI 11



5 cm

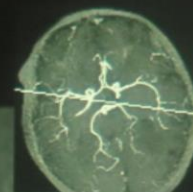
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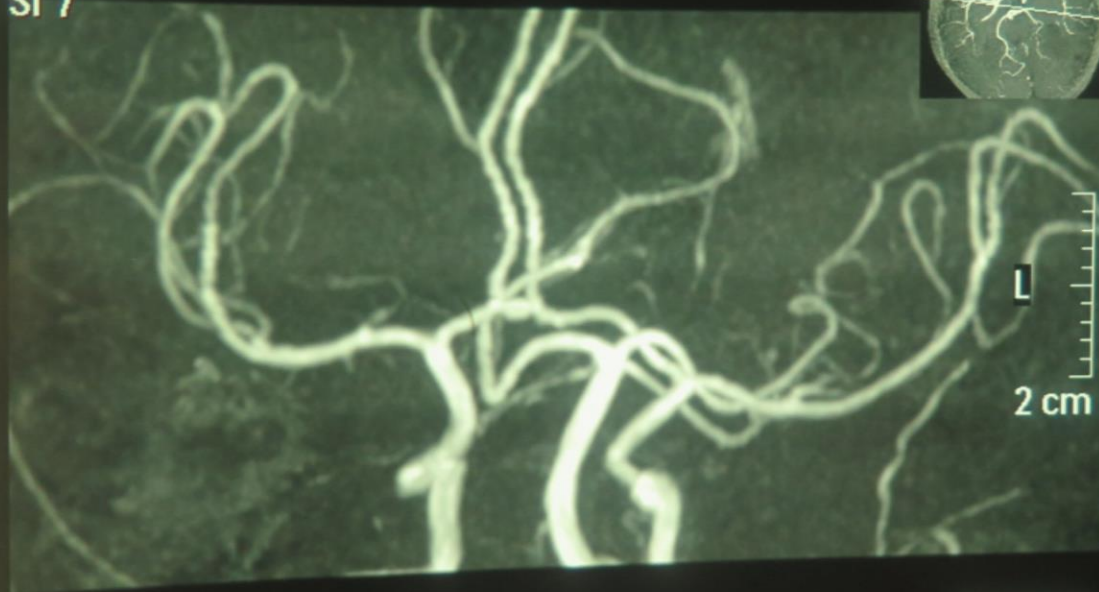
Sc 3
T1FFE/M
SI 7

H

AP 3 post



Sc 3
T1FFE/M
SI 8



L
2 cm



Sc 3
T1FFE/M

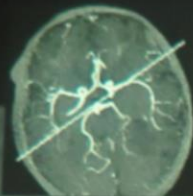
H

AP 3 post



10/19/2017
Sc 3
T1FFE/M
SI 11

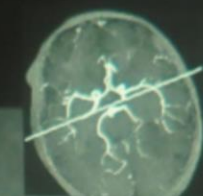
RL 5 left



Sc 3
T1FFE/M
SI 5

H

RL 5 left



Sc 3
T1FFE/M
SI 6

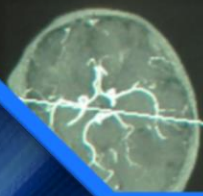
L

2 cm

L

2 cm

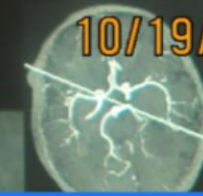
AP 3 post



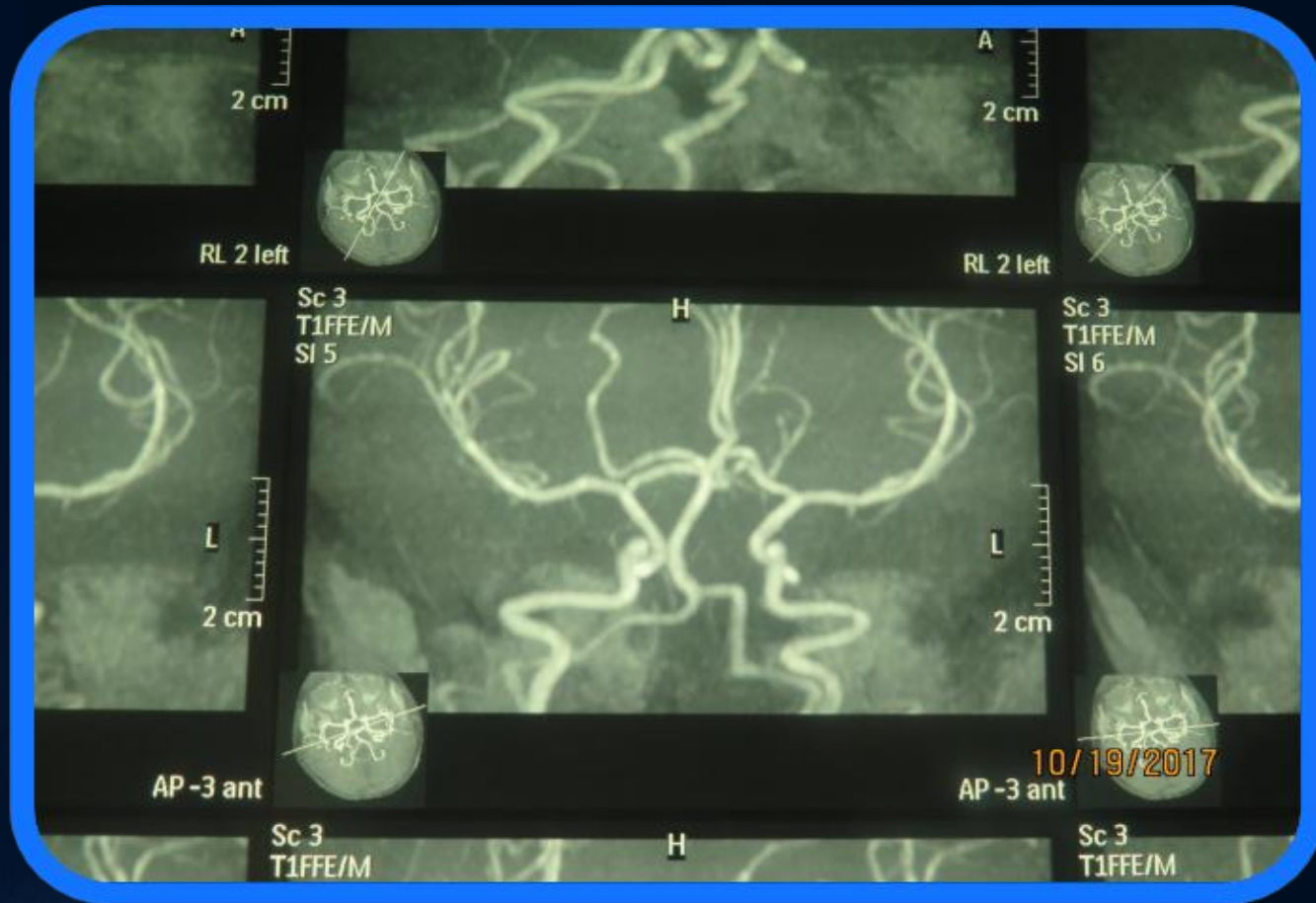
Sc 3
T1FFE/M
SI 8

H

AP 3 post



10/19/2017
Sc 3
T1FFE/M
SI 9



Sc 2
TSE/M
SI 7



Sc 2
TSE/M
SI 8



Sc 2
TSE/M
SI 9

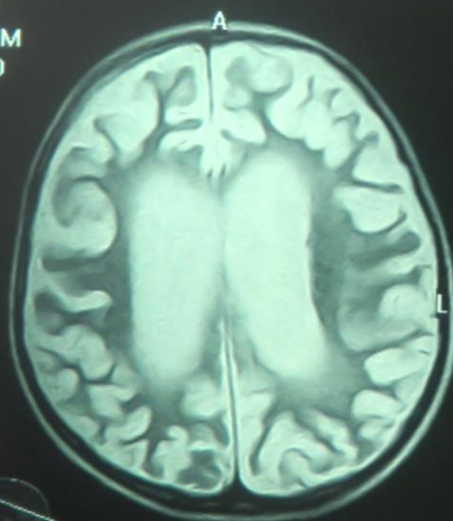


FH 8 head

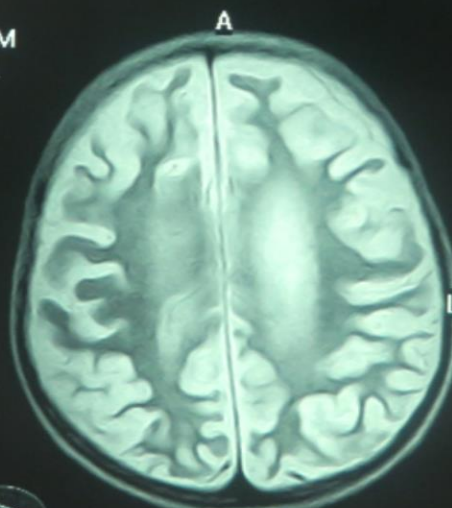
FH 15 head

FH 22 head

Sc 2
TSE/M
SI 10



Sc 2
TSE/M
SI 11

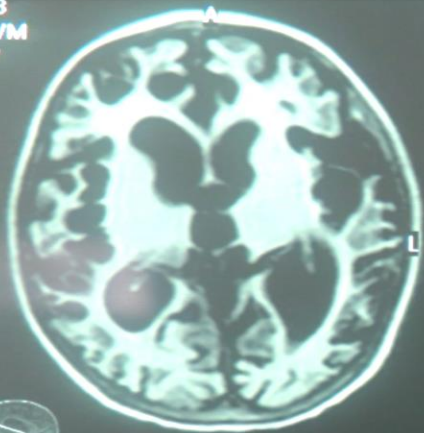


Sc 2
TSE/M
SI 12

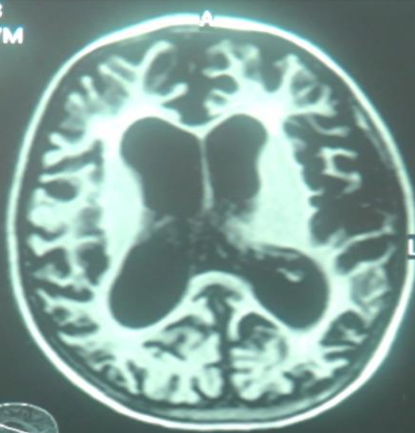


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Sc 3
TIR/M
SI 7



Sc 3
TIR/M
SI 8



Sc 3
TIR/M
SI 9

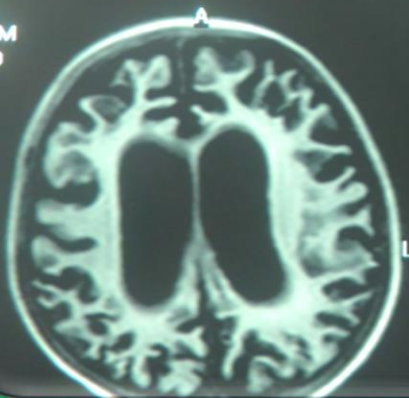


FH 15 head

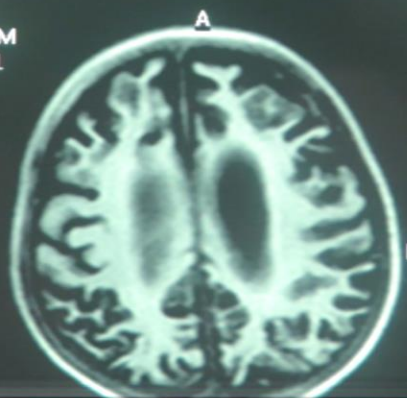


FH 21 head

Sc 3
TIR/M
SI 10



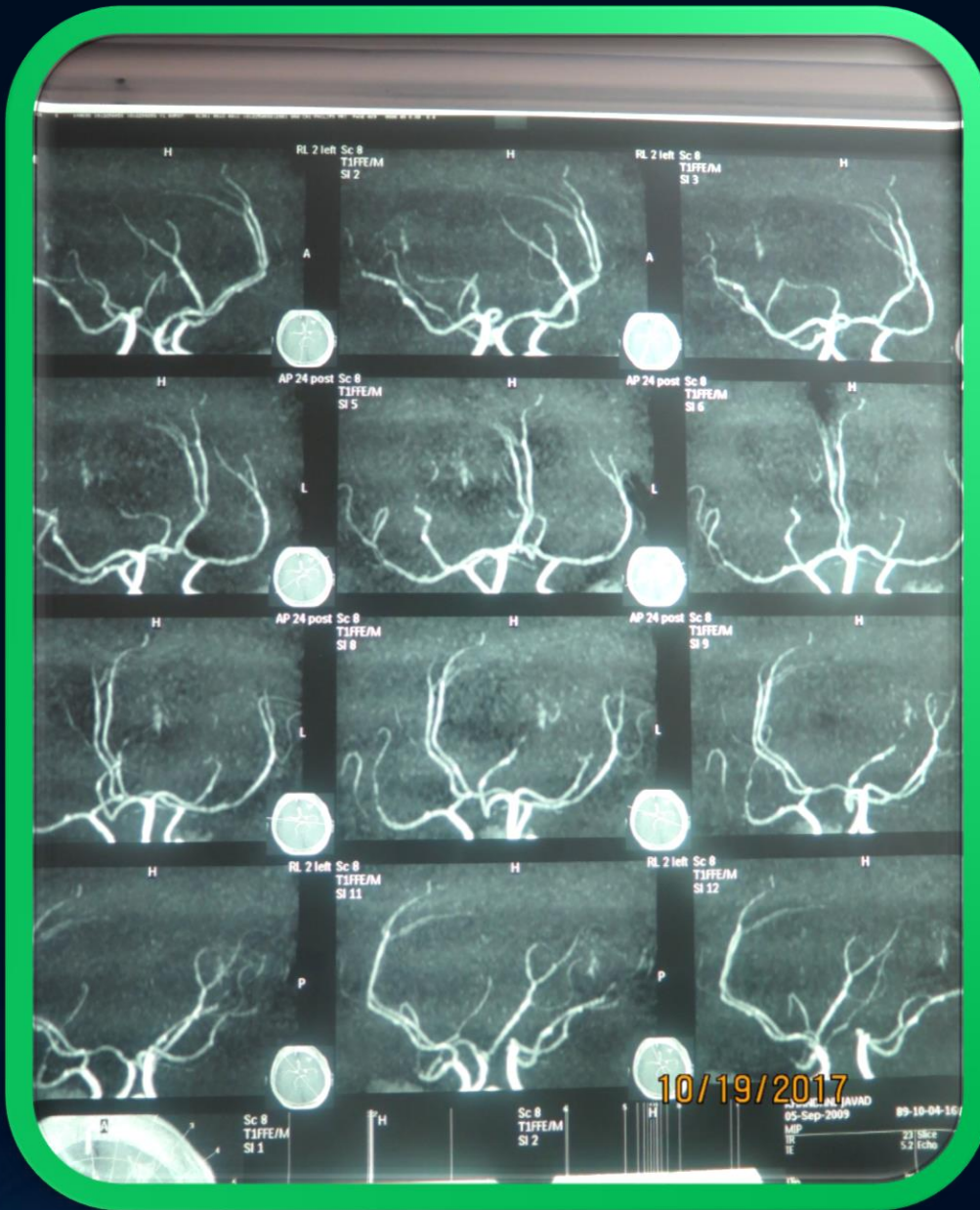
Sc 3
TIR/M
SI 11



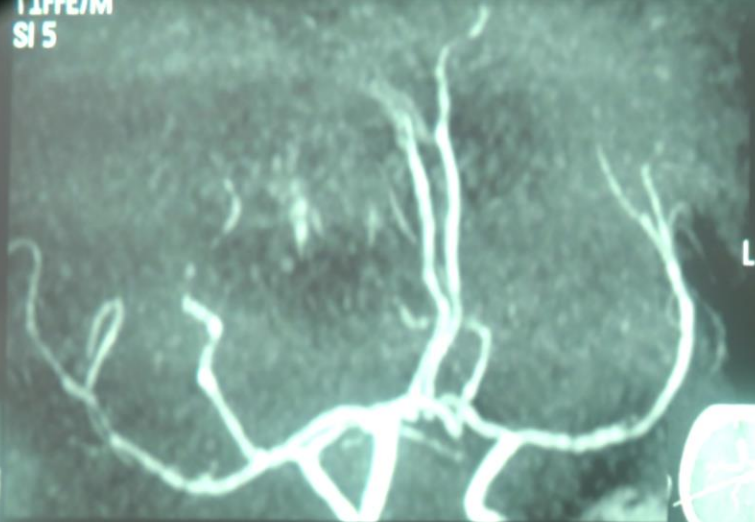
Sc 3
TIR/M
SI 12



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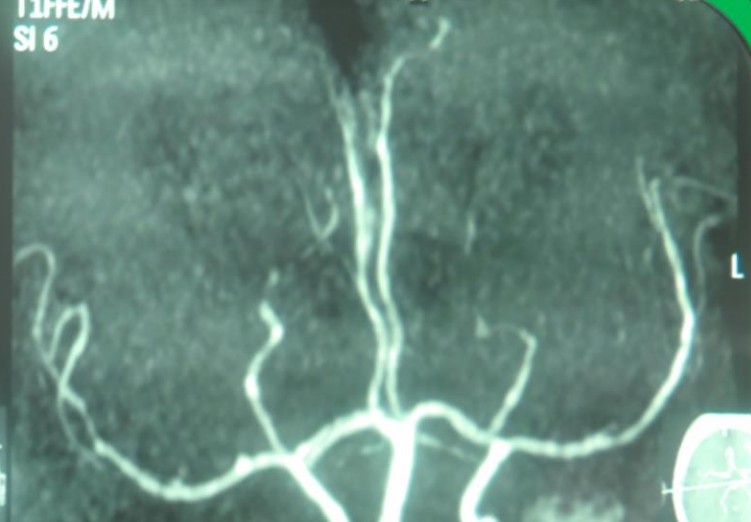


T1FFE/M
SI 5



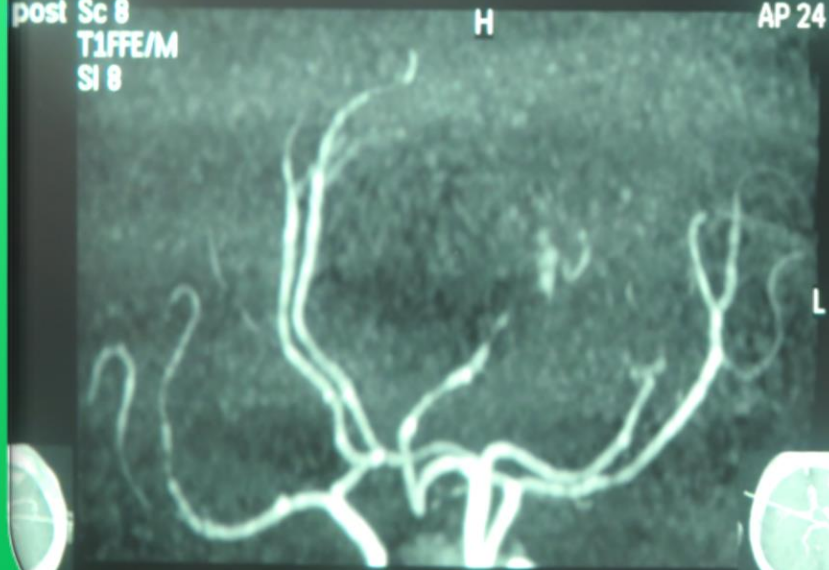
L

T1FFE/M
SI 6



L

post Sc 8
T1FFE/M
SI 8



H

AP 24 post Sc 8
T1FFE/M
SI 9



H

AP 24 p

10/19/2017

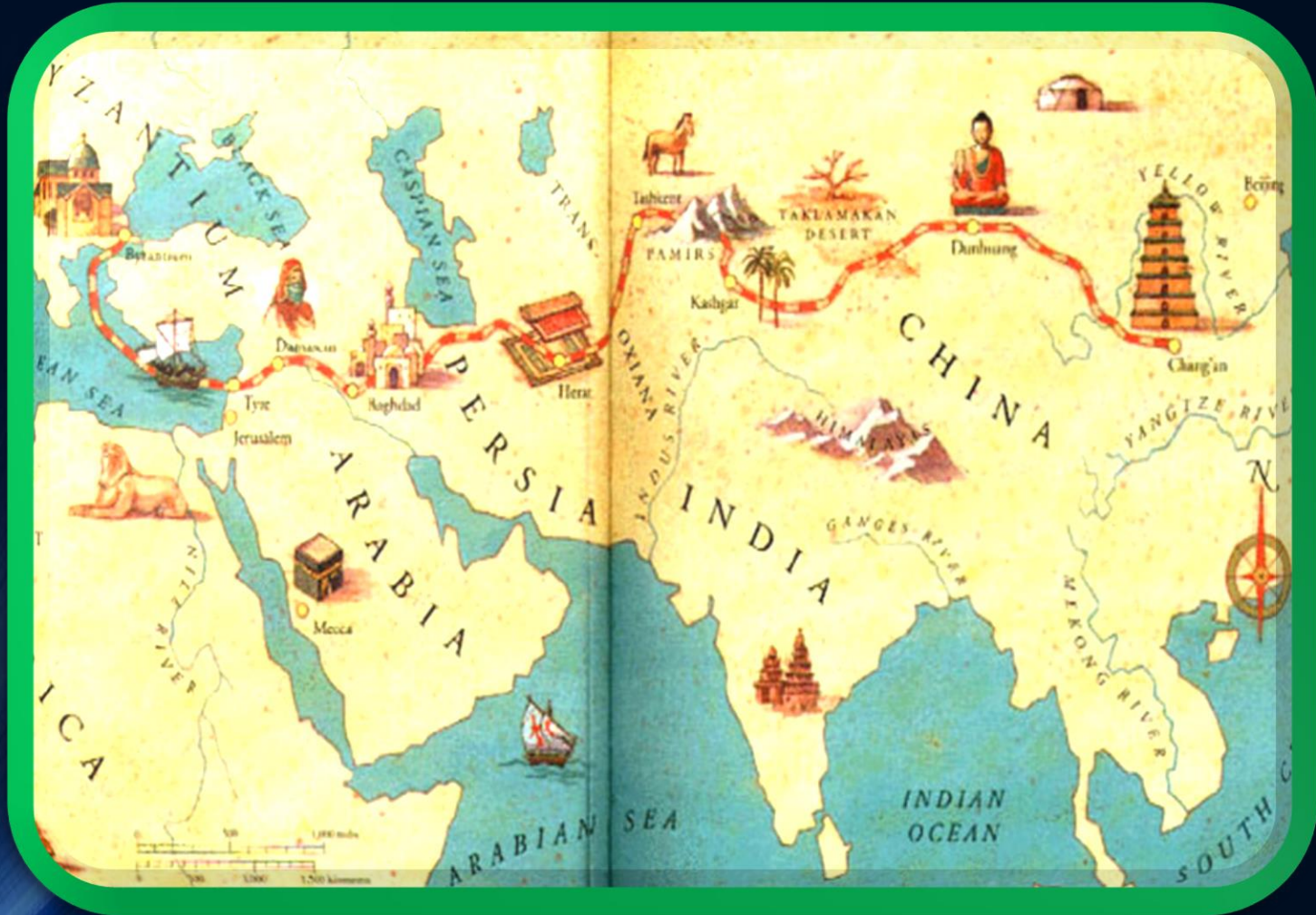
Sc 8

H

Pl 2 left Sc 8

H

ANCIENT SILK ROAD





CNS Vasculitis belongs to

Rheumatologists :

please don't miss it.



THANK YOU FOR LISTENING

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DEATH BY POWERPOINT



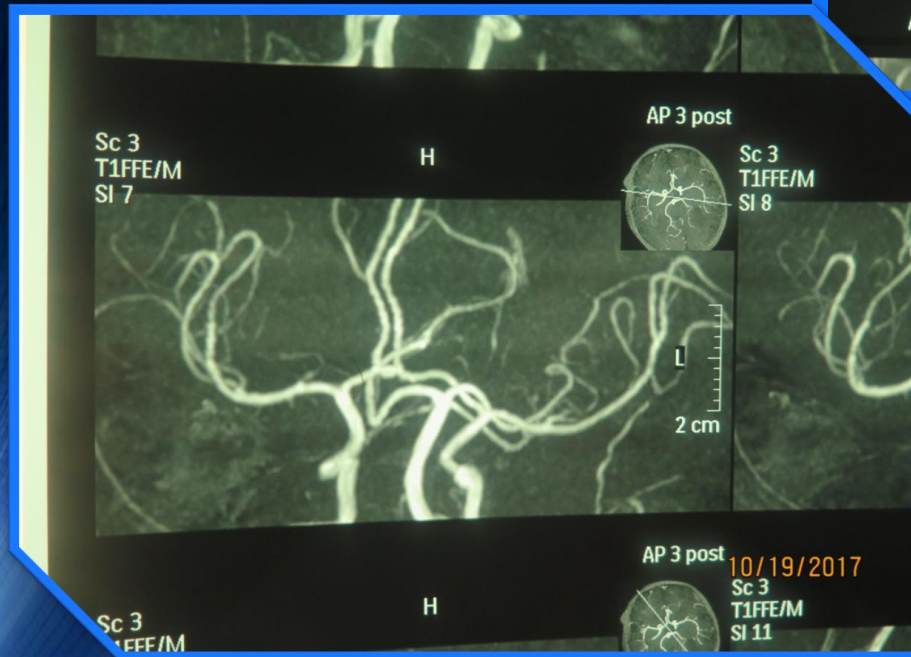
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We Know Memes

Distal vessel inflammation is commonly seen in P-cPACNS and SV-cPACNS. Notably, P-cPACNS patients have both large- and small-vessel inflammation and will therefore present with overlapping clinical features

- SV-cPACNS patients present with predominantly diffuse deficits, mild to moderately elevated inflammatory markers in the CSF, and multifocal MRI lesions.
- **SV-cPACNS** :
 - is increasingly recognized in children, who may present with an **unexplained**,
 - severe cognitive decline,
 - headaches,
 - and/or seizures.

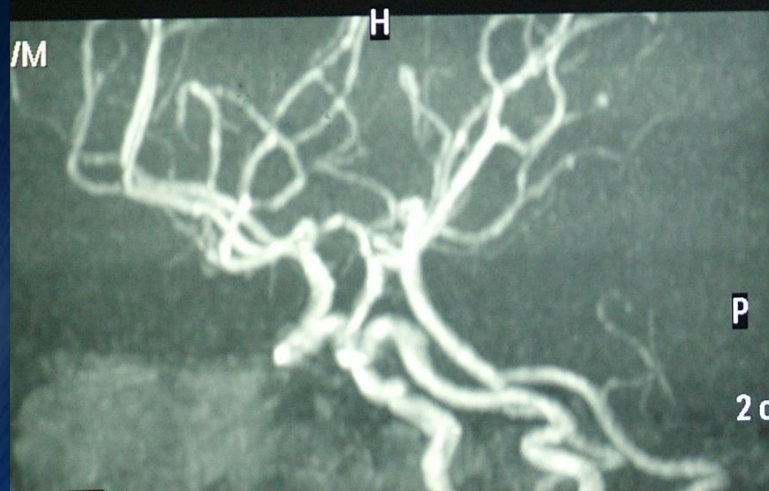
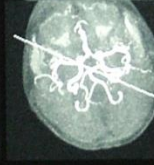
- Large–medium vessel vasculitis
-
-
- Clinically, this disease typically presents with headache, acute hemiparesis, hemisensory deficits or fine motor deficits. Diffuse neuro-logical deficits such as neurocognitive dysfunction are less common







AP -3 ant



Sc 3
T1FFE/M
SI 11



