

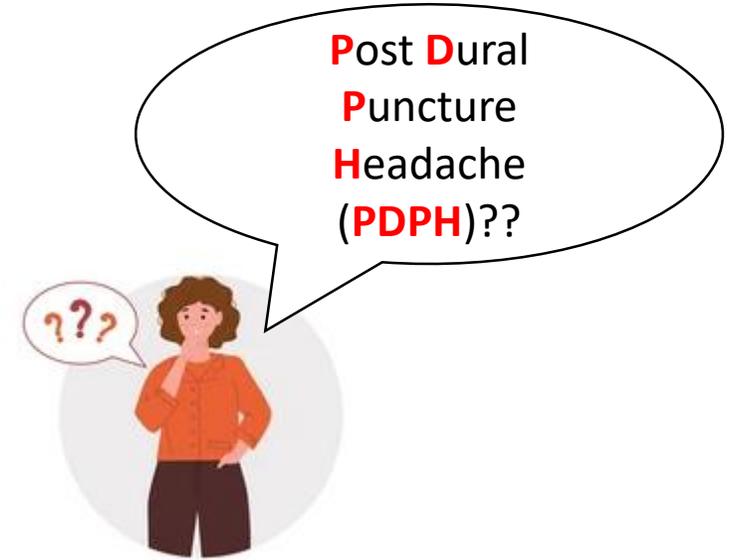
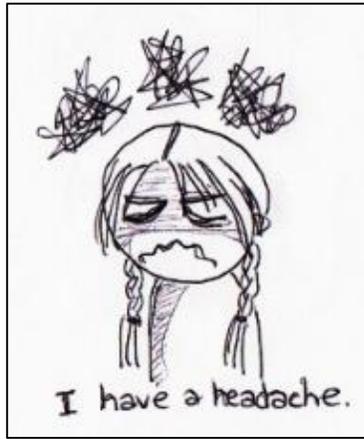


SAOA Spring meeting / SSAR 2022
– May 7, 2022

Postpartum headache: not always a post dural puncture headache...

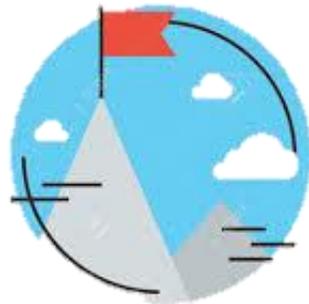


Dre Domitille DEREU
Médecin adjointe
Unité d'anesthésie gynéco-obstétricale
Geneva University Hospitals



OBJECTIVES

1. Describe and identify the causes of **P**ostpartum **H**eadache (**PH**)
2. Propose a **diagnosis strategy**
3. Focus on **red flag situations** requiring a specialized management



1. Epidemiology

POST-PARTUM: A PERIOD OF RISK

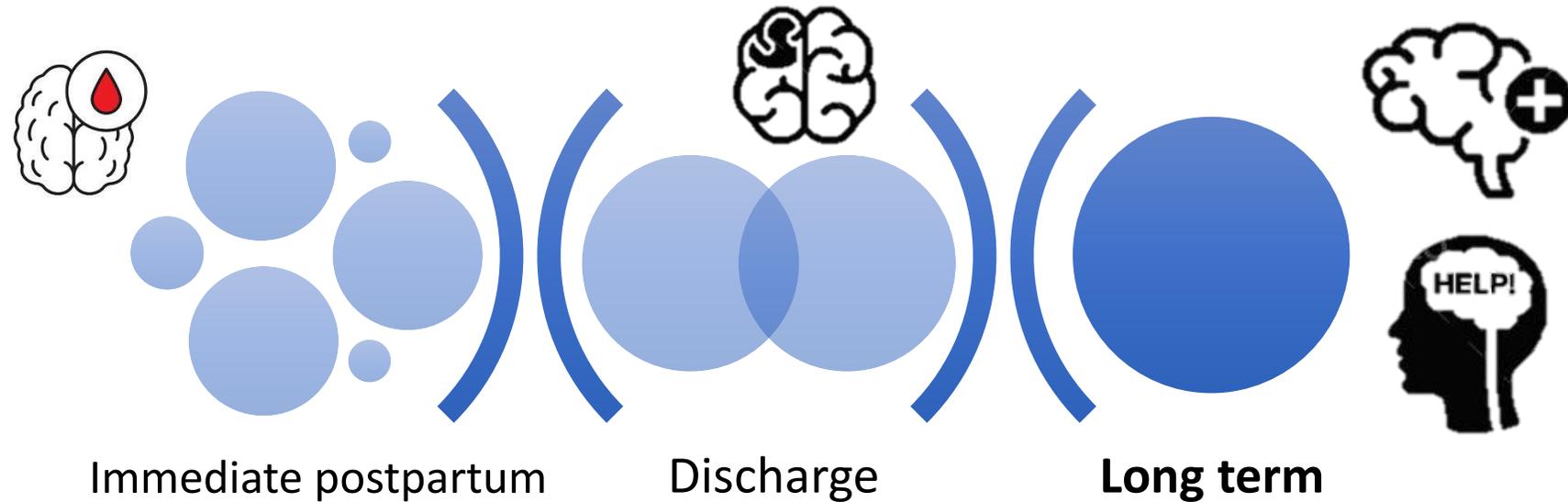
- Post partum headaches
 - **40% of post-partum women** have headaches
 - 10% of these incapacitating
 - Median onset day 2
 - **Onset during hospitalisation 82 % / after discharge 18%**
 - **> 50 % primary, 25-40 % secondary headaches**

Goldszmidt E. CAN J ANESTH 2005

Stella CL, AJOG 2007

Spierings, Neurology 2016

POST-PARTUM: A PERIOD OF RISK



- Maximum risk of **STROKE** **last 2 days of pregnancy to Day 1 postpartum**
- **THROMBO EMBOLIC** risk up to **3 months postpartum**
- **Risk of complication of complication**
- **Patient no longer labelled "obstetrical"**

2. Etiologies

ETIOLOGIES

Primary headaches

Secondary
headaches

ETIOLOGIES

Primary headaches



More than
50%

- Tension headaches
- Migraine
- Cluster headache



MIGRAINE SUFFERERS

- 34% of **recurrence** in the first week after delivery
- Higher risk of PH (event other causes)

ETIOLOGIES

Primary headaches



**More than
50%**

**Secondary
headaches**

ETIOLOGIES

Primary headaches



More than
50%

Secondary
headaches



Often missed outside
the obstetrical context

ETIOLOGIES

Primary headaches

More than 50%

- Tension headaches
- Migraine
- Cluster headache

Secondary headaches

ANAESTHESIA/ OBSTETRIC COMPLICATION

- PDPH 15%
- Pre-eclampsia
- Pituitary apoplexy

ETIOLOGIES

Primary headaches

More than 50%

- Tension headaches
- Migraine
- Cluster headache

Secondary headaches

ANAESTHESIA/ OBSTETRIC COMPLICATION

- PDPH 15%
- Pre-eclampsia
- Sheehan's syndrome

- Often omitted in maternity wards
- Often the most serious...

ETIOLOGIES

Primary headaches

More than 50%

- Tension headaches
- Migraine
- Cluster headache

Secondary headaches

ANAESTHESIA/ OBSTETRIC COMPLICATION

- PDPH 15%
- Pre-eclampsia
- Pituitary apoplexy

NEUROLOGICAL

- Cranial vascular disorders
 - SAH, subdural hematoma
 - Intracranial hemorrhage
 - Cerebral venous sinus thrombosis (CVST)
 - PRES, RCVS
 - Cervical artery dissection
- Non-vascular cranial disorders
 - Space occupying lesion
 - Meningitis

The major issue is to **think about secondary headaches....**

Table 2.—Final Headache Diagnosis in 63 Postpartum Women Receiving Inpatient Neurology Consultation

Headache Diagnosis N (%)		
PRIMARY	17 (27.0)	27%
Migraine	13 (20.6)	
Migraine without aura	10	
Migraine with aura	3	
Nonmigraine primary headache disorder	4 (6.3)	
Tension-type	1	
Occipital neuralgia [†]	1	
Cervicogenic [†]	1	
Primary thunderclap headache [‡]	1	
SECONDARY	46 (73.0)	73%
Postdural puncture headache	21 (33.9)	PDPH 34%
Postpartum preeclampsia (PEC)[§]	12 (19.4)	Pre-eclampsia 19.5%
Final differential diagnosis of PEC vs migraine, PEC listed first	6	
Vascular	10 (15.9)	Vascular 16%
Pituitary apoplexy	2 (3.2)	
with preeclampsia	1	
Cerebral venous thrombosis	1 (1.6)	
Moyamoya	1 (1.6)	
RCVS	3 (4.7)	
with preeclampsia and PRES	1	
with eclampsia	1	
PRES	2 (3.2)	
Vertebral artery dissection	1 (1.6)	
Headache attributed to use of medication	2 (3.2)	
Headache attributed to acute anemia	1 (1.6)	

The major issue is to think about secondary headaches....

Table 2.—Final Headache Diagnosis in 63 Postpartum Women Receiving Inpatient Neurology Consultation

Headache Diagnosis	N (%)
PRIMARY	17 (27.0)
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Migraine without aura	10
Migraine with aura	3
Nonmigraine primary headache disorder	
Tension-type	
Occipital neuralgia	
Pituitary apoplexy	2 (3.2)
with preeclampsia	1
Cerebral venous thrombosis	1 (1.6)
Moyamoya	1 (1.6)
RCVS	3 (4.7)
with preeclampsia and PRES	1
with eclampsia	1
PRES	2 (3.2)
Vertebral artery dissection	1 (1.6)
Headache attributed to use of medication	2 (3.2)
Headache attributed to acute anemia	1 (1.6)

27%

And how many among patients who did not receive a neurological consultation?

- PDPH 34%
- Pre-eclampsia 19.5%
- Vascular 16%

3. Clinical cases

CLINICAL CASE 1

- **Mrs W: elective caesarean section for severe IUGR (<P3)**
 - History of cannabis use
 - Under spinal anesthesia 25G
 - Use of vasopressors for bradycardia and hypotension: Atropin, Ephedrin and Phenylephrin

- **After 10 minutes:**
 - **Extremely intense thunderclap headache**, regressing spontaneously in a few minutes
 - Agitation
 - End of intervention trouble-free

CLINICAL CASE 1

○ At day 5

- Midwife call for suspected PDPH
- **New episode of intense headaches** "*explosive, the worst in her life*", holocranial, spontaneously regressing < 1 min
- Not posture-dependent, without visual or hearing impairment



Really a PDPH??



POST DURAL PUNCTURE HEADACHE

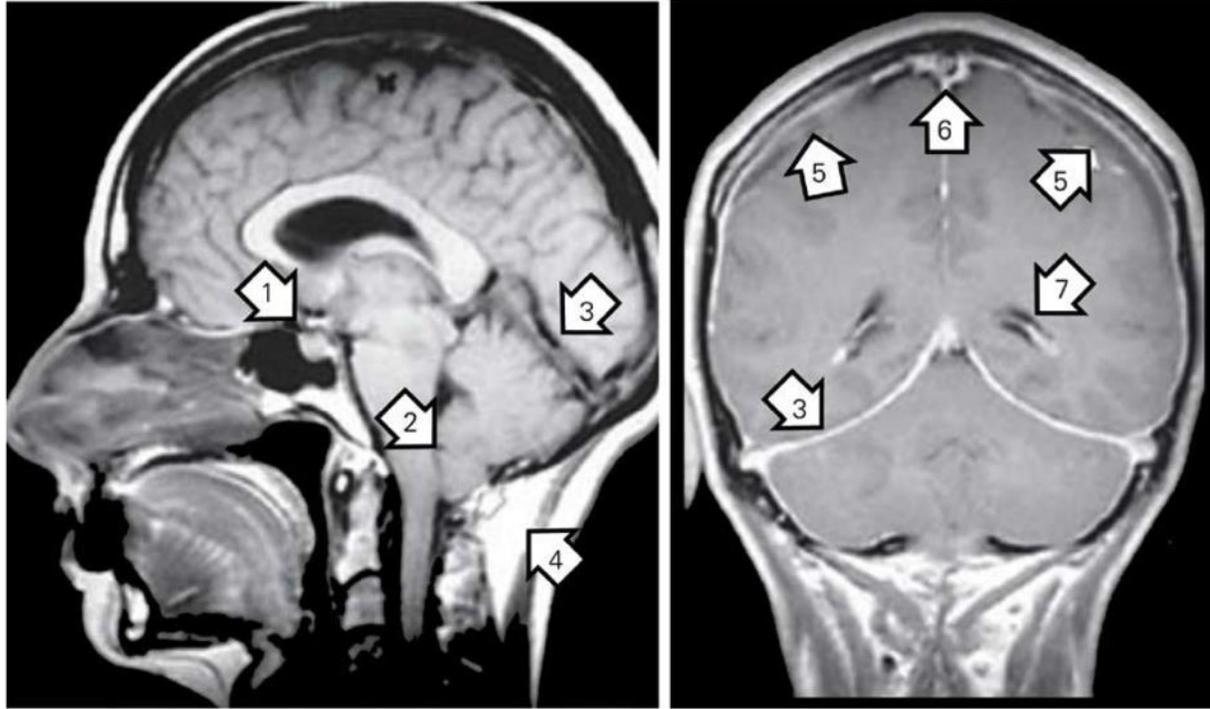
PRESENTATION OF PDPH

- **Severe bilateral headache, 1 to 7 days after epidural**
- Location: **fronto-occipital** (helmet), nuchalgy
- **Orthostatic +++** = posture-dependent, disappearing when lying down in 10-15 minutes
- Associated with: diplopia, hypoacusis, tinnitus, nausea, vertigo



ATYPICAL PRESENTATIONS

- Particularly if history of migraine
- non-postural headache (5.6% of 142 parturients): *Loures et al, IJOA 2014*
- stiffness and pain located only in the cervical, thoracic or lumbar vertebral area
- neuropsychiatric disorders, frontal lobe syndrom, psychosis: *Loures et al, BJA 2014*



MRI

1. Enlargement of the pituitary gland
2. **Lower cerebellar tonsils**
3. **Thickening of the intracranial meninges.**
4. Thickening of the meninges in the cervical region.
5. Bilateral subdural fluid collection.
6. Sagittal sinus dilatation (venous hypertension).
7. Small lateral ventricles.

CLINICAL CASE 1

○ **At day 6**

- Patient always agitated, aggressive
- No more headaches
- **MRI to rule out pituitary apoplexy** (on request of internists)

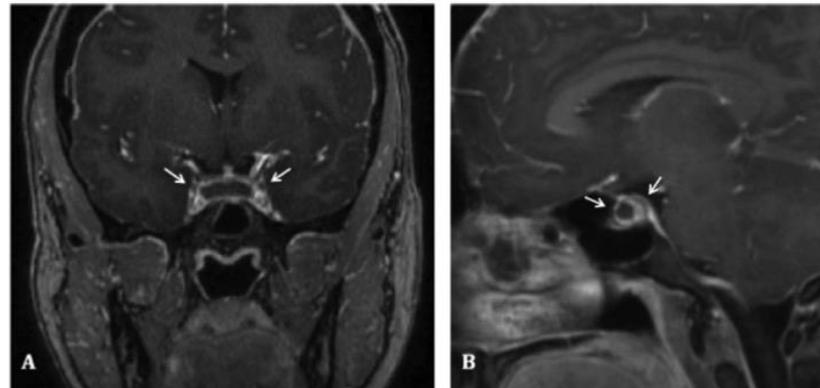


PITUITARY APOPLEXY (SHEEHAN SYNDROM)



PRESENTATION PITUITARY APOPLEXY

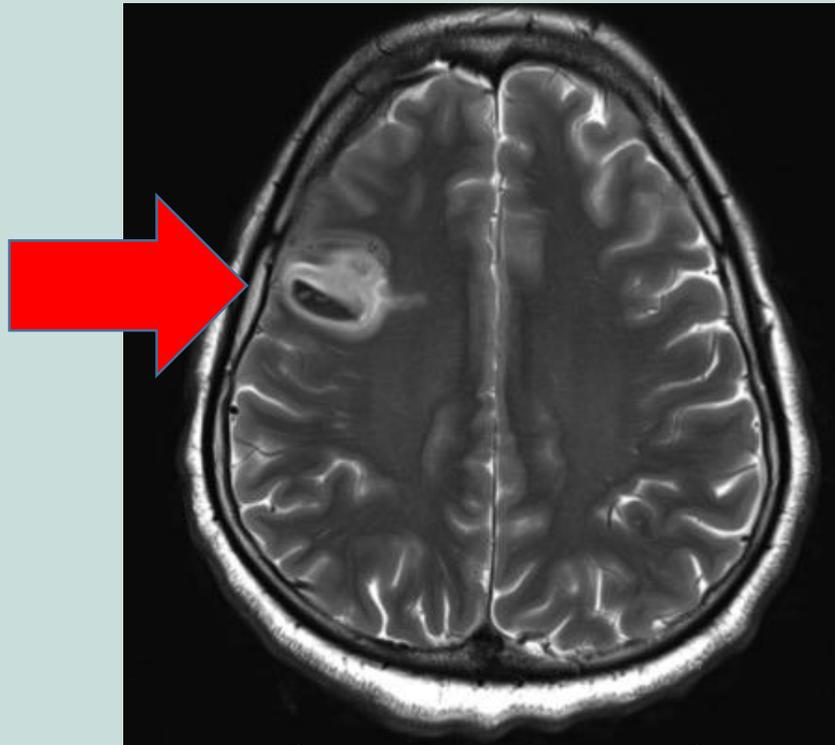
- Severe, **constant** headache located in the centre of the skull and in the **retro-orbital region** + **reduced visual acuity** (bitemporal hemianopsia)
 - **Lactation failure**, amenorrhea, asthenia, corticotropic insufficiency and hypopituitarism
-
- **Pathophysiology: context of severe PPH 1-2L of blood + hypotension → hypoperfusion → ischemia and necrosis of the anterior pituitary lobe**
 - More frequent in cases of pituitary adenoma.
 - MRI: enlarged pituitary gland, peripheral enhancement, central isodense region



CLINICAL CASE 1

○ Day 6: Cerebral MRI

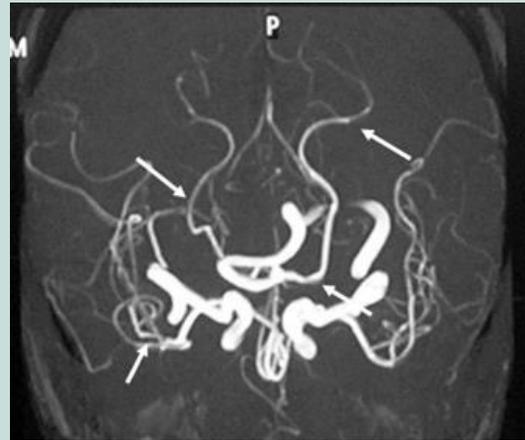
- Right frontal lesion with hematic and ischaemic components and SAH opposite.



CLINICAL CASE 1

○ Day 6: Cerebral MRI

- **Angio MRI: Caliber irregularities** in the distal branches of the right middle and posterior cerebral arteries



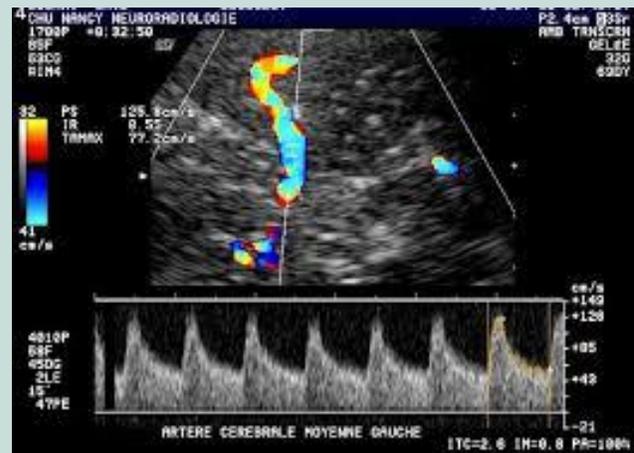
- Review by Chief of Neuroradiology: images compatible with

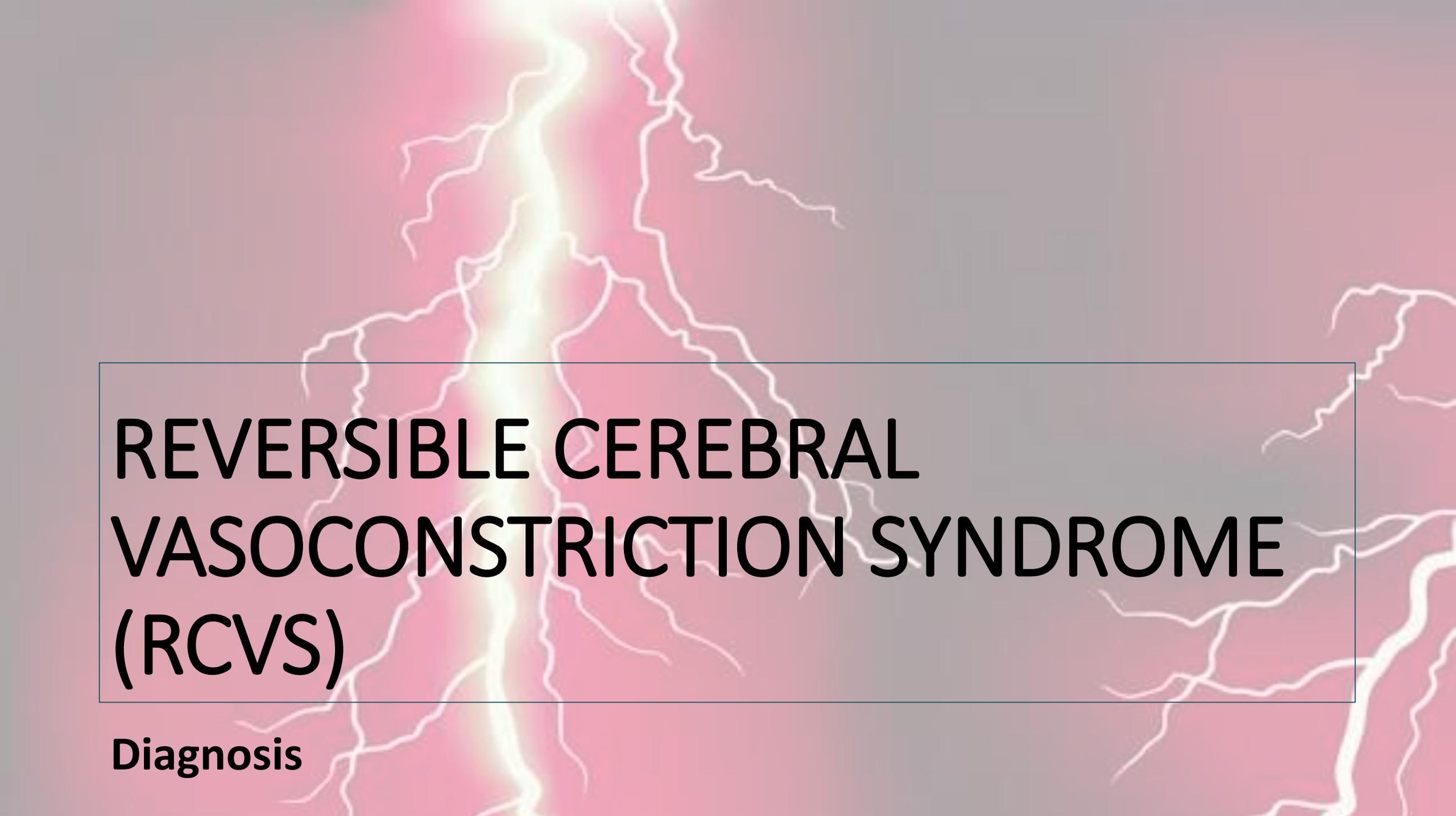
REVERSIBLE BRAIN VASOCONSTRICTION SYNDROME

CLINICAL CASE 1

○ Day 6:

- Trans-cranial Doppler: **Focal accelerations in the same arteries** (middle cerebral arteries D 158 > G 145, and the right anterior cerebral artery Vs 134).
- Transfer to neurology CS for monitoring and introduction of **Nimodipine** for prevention of vasospasm



A background image featuring a bright yellow lightning bolt striking down from the top center, with several smaller, fainter lightning bolts branching out across a dark red and purple gradient sky. The text is overlaid on this background.

REVERSIBLE CEREBRAL VASOCONSTRICTION SYNDROME (RCVS)

Diagnosis

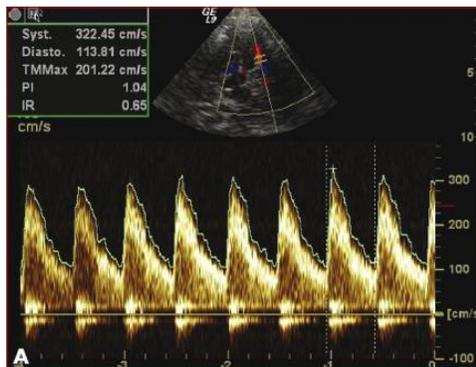
PRESENTATION RCVS

HEADACHE :

- **focus of the symptomatology : often the only symptom in 75% of cases**
- **Severe to intolerable (88 to 100%), bilateral, posterior and then diffuse**
- In **thunderclap** (lasting < 1min)
- In bursts over 1 to 4 weeks

Associated signs:

- = suspicion of complication??
- Nausea, vomiting, photophobia
- Coma (3%)
- Focal signs



TRANS-CRANIAL DOPPLER

Acceleration of intracranial velocities (>70% of cases)

Signs may be delayed by few days

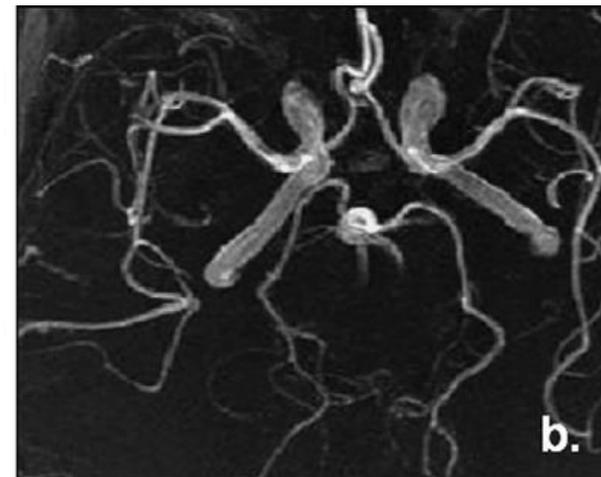
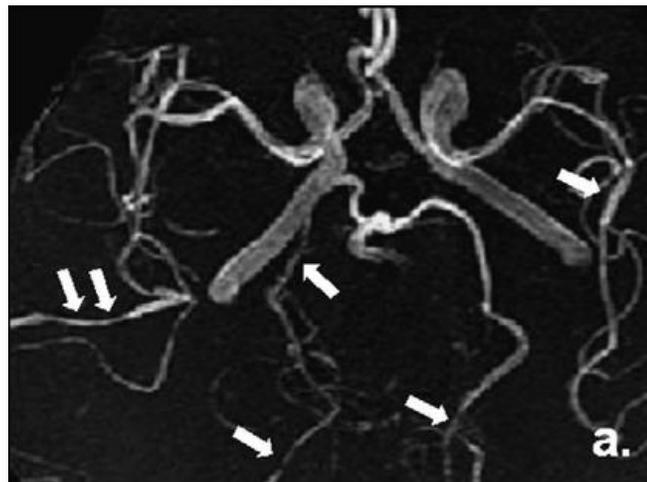
IMAGING : ANGIO MRI

TYPICAL MULTIFOCAL SEGMENTAL CEREBRAL ARTERY VASOCONSTRICTION ASPECT MRA, arteriography

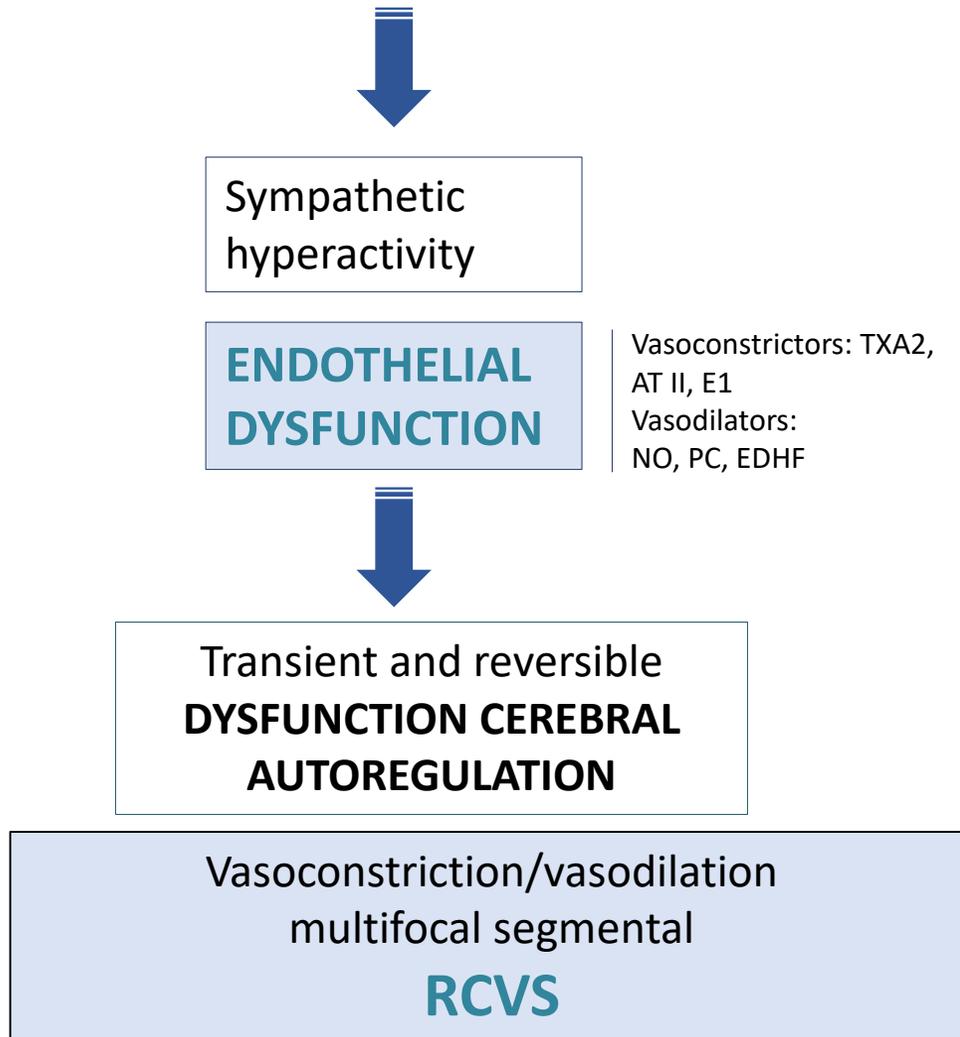
- Aspect of **string of pearls**
- On anterior and/or posterior circulation, bilateral and diffuse
- **Medium and large caliber arteries** (basilar trunk, carotids)
- **Dynamics**



DEFINITE DIAGNOSIS BY **REVERSIBILITY AT 12 WEEKS**

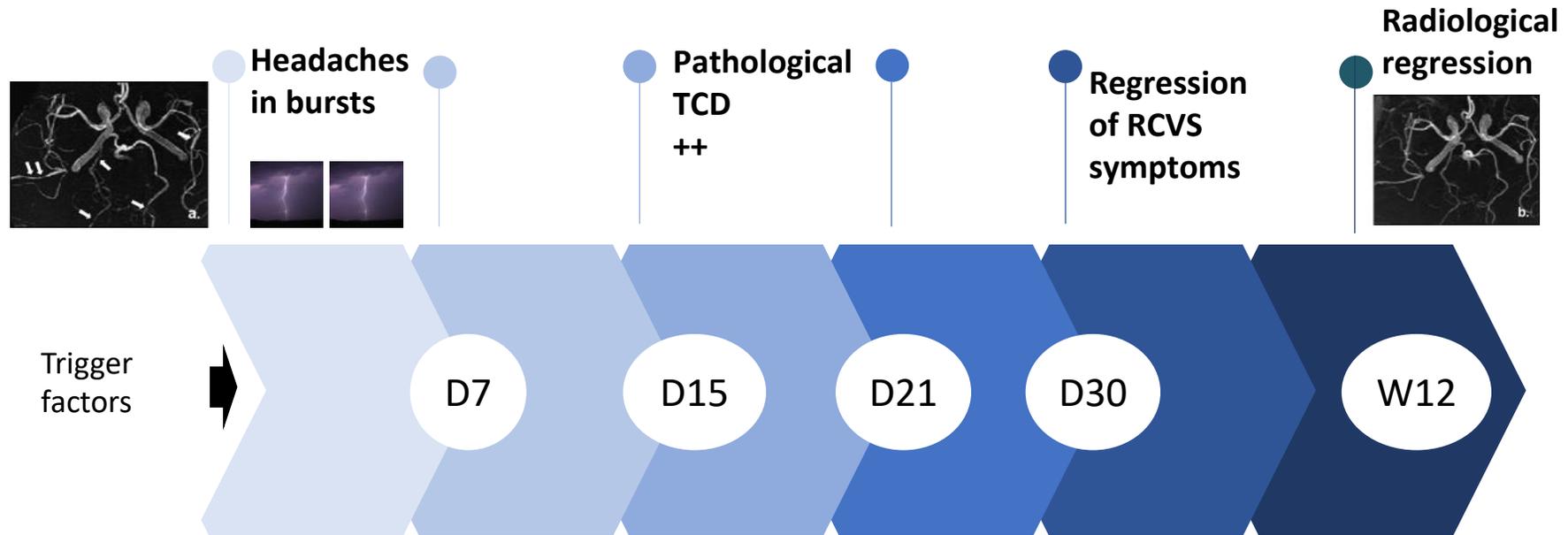


1. Predisposing factors (women ++)
2. Precipitating factors

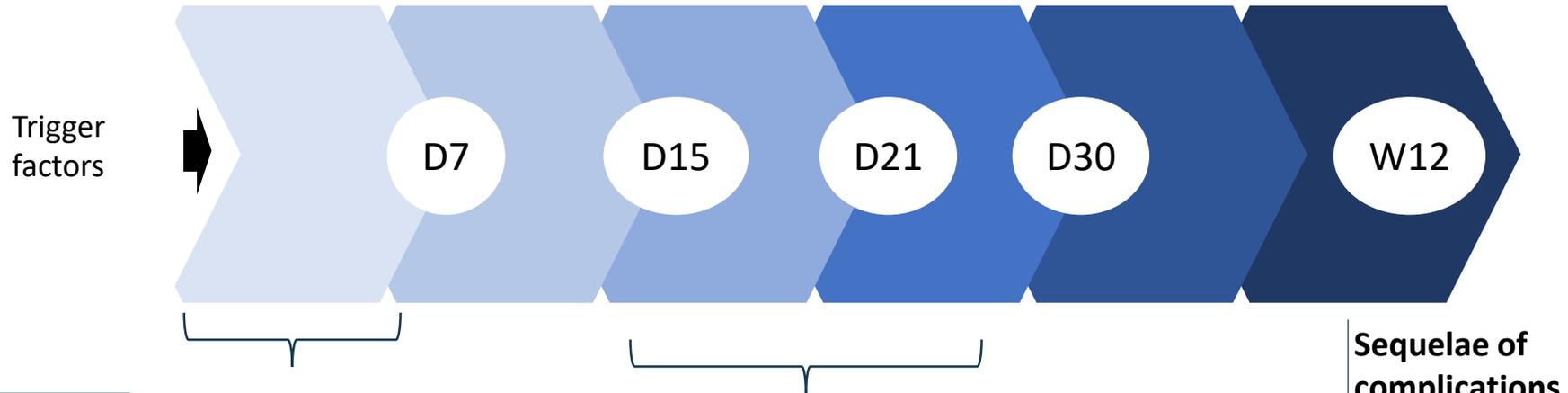


- Post partum**^{2,18,50,97}
- With or without vasoactive substances, with or without eclampsia or pre-eclampsia
- Vasoactive drugs**^{2,5,9}
- Illicit drugs—eg, cannabis,^{5,34} cocaine,¹⁰⁵ methylenedioxymethamphetamine,²⁹ amphetamines, lysergic acid diethylamide
 - Antidepressants—eg, selective serotonin reuptake inhibitors,^{6,59} serotonin–noradrenaline reuptake inhibitors^{9,59}
 - α-sympathomimetics—eg, nasal decongestants (phenylpropanolamine, pseudoephedrine, ephedrine),^{98,99} norepinephrine¹⁰⁰
 - Triptans^{8,41,52,101,102}
 - Ergot alkaloid derivatives⁵⁰—eg, methergine, bromocriptine,¹⁰³ lisuride⁴⁸
 - Nicotine patches⁵
 - Ginseng and other herbal medicines^{22,53,104}
 - Binge drinking⁵
- Catecholamine-secreting tumours**^{15,108}
- Pheochromocytoma, bronchial carcinoid tumour, glomus tumours
- Immunosuppressants or blood products**
- Intravenous immunoglobulin,⁴⁶ red-blood-cell transfusion,¹⁰⁹ interferon alfa⁵
- Miscellaneous**
- Hypercalcaemia, porphyria, head trauma,^{110–112} neurosurgery,^{95,113} subdural spinal haematoma, carotid endarterectomy,^{55,114} cerebral venous thrombosis,¹¹⁵ CSF hypotension,¹¹⁶ autonomic dysreflexia,¹¹⁷ phenytoin intoxication¹¹⁸

TYPICAL EVOLUTION OF RCVS



EVOLUTION OF RCVS WITH COMPLICATIONS



Risk factors:
Migraine

Haemorrhagic complications:

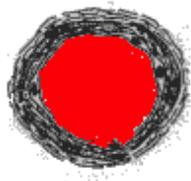
- SAH (22%)
- ICH (6%)

PRESS

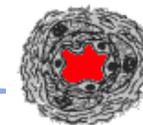
Ischaemic complications:

- Transient (16%)
- Stroke (4%)

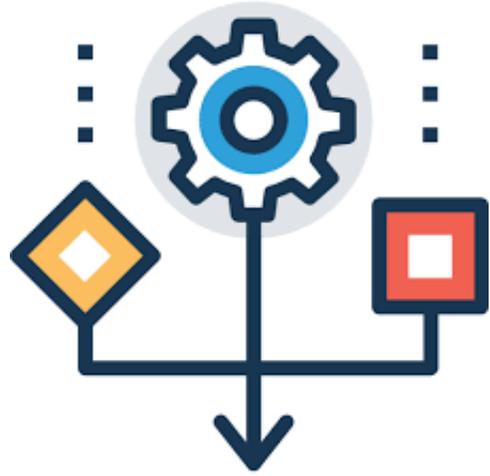
Sequela of complications
<10%.



Vasodilatation
Distal arteries
Stretch walls: headaches
Hemorrhage



Vasoconstriction
Proximal arteries
Ischemia
Severity



5. Diagnostic approach

In 4 points

P

C

E

A



In 4 points

- P** RESENTATION
- C** ONTEXTE
- E** VOLUTION
- A** SSOCIATION



P

PRESENTATION

Typical presentation

Similar previous episodes

Tension headaches

Migraine

Cluster headache

Orthostatic

Meningismus

Inflammatory syndrome

Meningitis

PDPH

Sign of severity
Atypical presentation



RED FLAGS

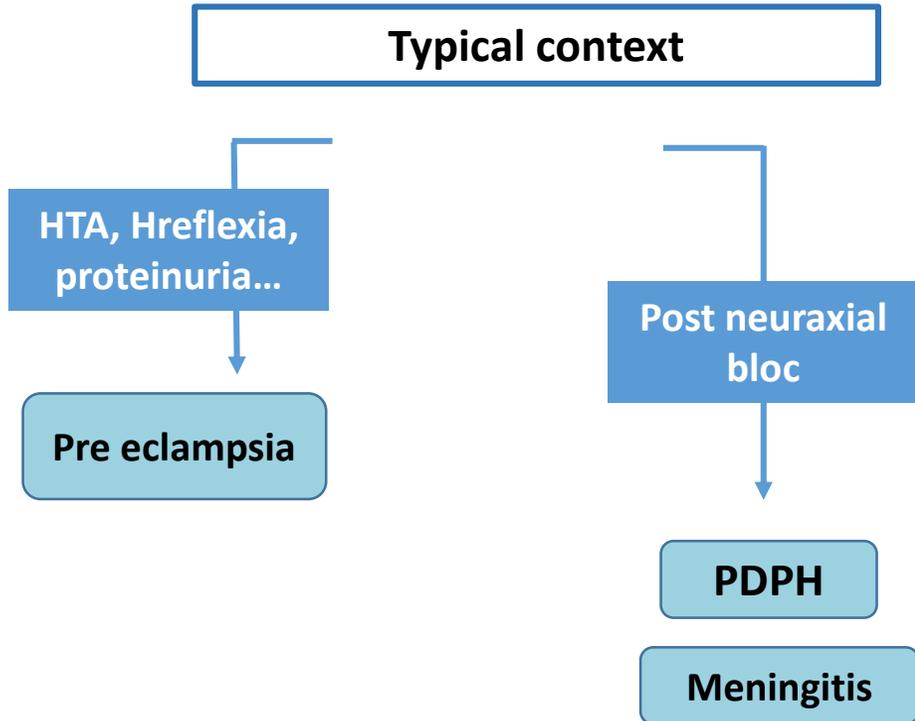
- Unusual headache, fixed on one side
- Thunderclap headache
- Abnormal neurological signs
- Disturbance of consciousness
- Seizures
- Signs of intra cranial hypertension

As an emergency:

- Specialist advice
- MRI (angio CT if not available)



C ONTEXTE



Atypical context

- RED FLAGS**
- Atypical pre eclampsia
 - Coagulopathy : thromboembolic risk
 - Post severe bleeding : Pituitary apoplexy if associated signs
-

Think:

- Specialist advice
- MRI (angio CT if not available)



E VOLUTION

**Atypical evolution
Atypical presentation**



RED FLAG

- Loss of orthostaticity (PDPH)
- Increasing over time and/or becoming predominant when lying
- Failure or recurrence after of 2 blood patches
- Association with coagulopathy

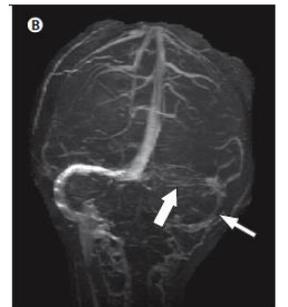
Subdural hematoma

**Cerebral venous sinus
thrombosis**

Other diagnosis?

Think:

- MRI (CT if not available)



CLINICAL CASE 2

- **Mrs A: vaginal birth under epidural analgesia**

- Day 3: typical **PDPH** → Blood patch. Improvement of headache for 24 hours

- **At day 15:**

- **unusual headache:** severe, throbbing headaches in the right temporal area. **No relation to position** since bloodpatch, becomes constant, even when lying
- → atypical evolution : MRI decision



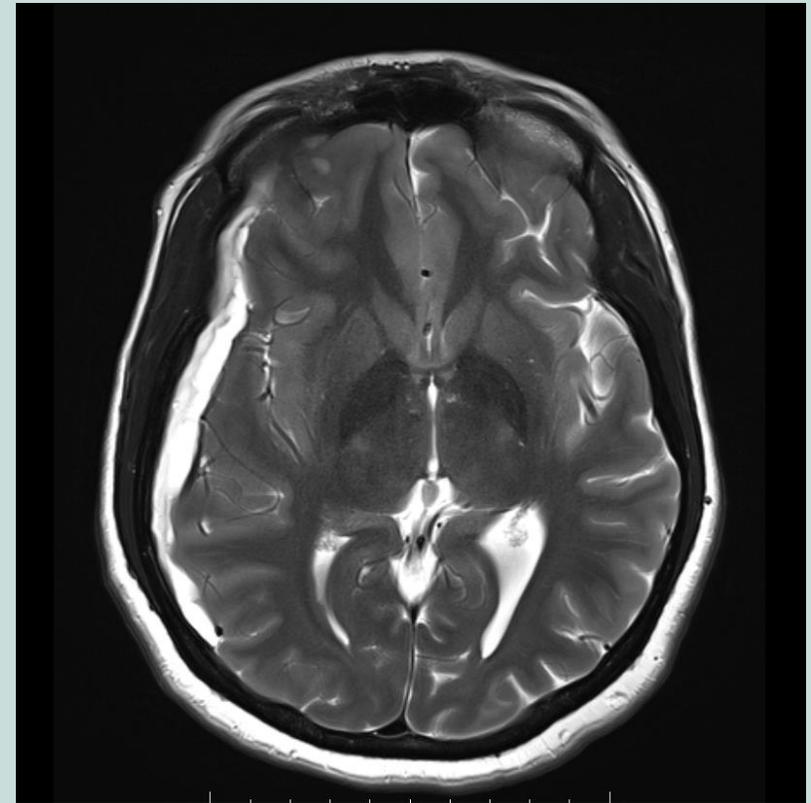
- **Just before MRI:**

- Generalized tonico-clonic seizure



CLINICAL CASE 2

- **Day 15: MRI**
 - **Subdural hematoma** of the right convexity
 - Emergency evacuation
 - Neurological recovery
 - Anti-epileptic treatment 3 months

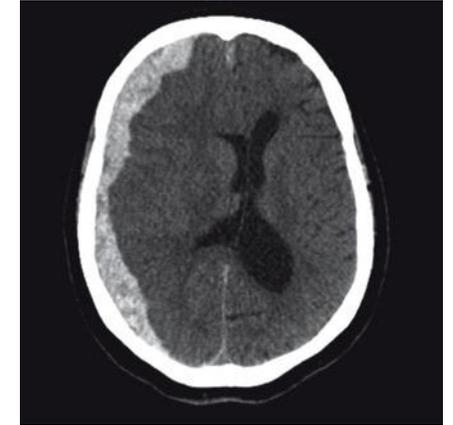


ATYPICAL EVOLUTION

- Non-response to 1-2 blood-patch
- Headache losing its postural character



Subdural hematoma



PRESENTATION SDH

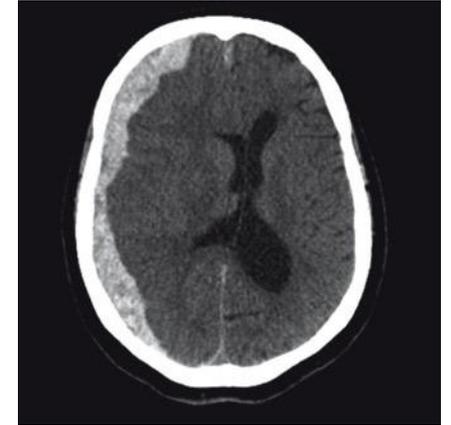
- Average onset : 25 days (30 hours to 5 months)
- SC: **Non-postural headaches**
- **90% of cases: associated with transient sensory-motor disturbances**
- +/- IH signs (drowsiness, vomiting, confusion), visual disturbances, urinary incontinence, confusion and ataxia.

ATYPICAL EVOLUTION

- Non-response to 1-2 blood-patch
- Headache losing its postural character

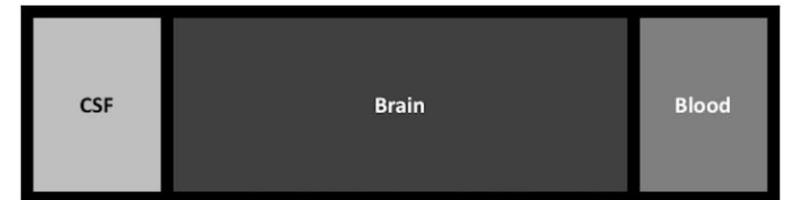


Subdural hematoma

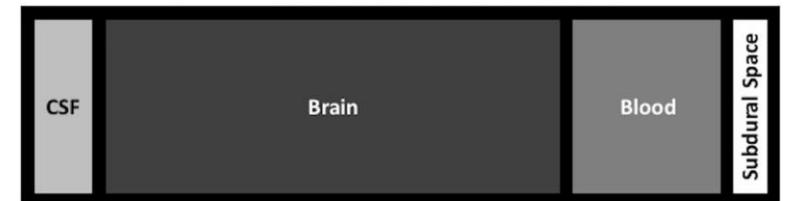


MECHANISM SDH

- Tearing of cortical blood vessels secondary to traction on the meninges from CSF leakage.



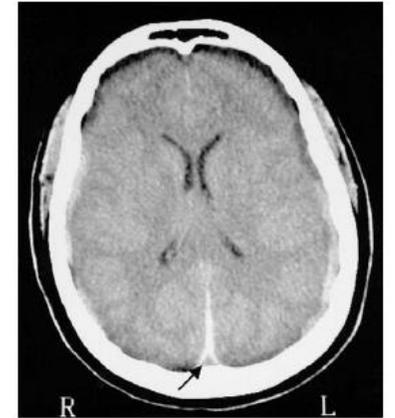
Normal



Intracranial Hypotension

ATYPICAL PRESENTATION

- Non-response to 1-2 blood-patch
- Non-orthostatic headache
- **Background: coagulopathy**



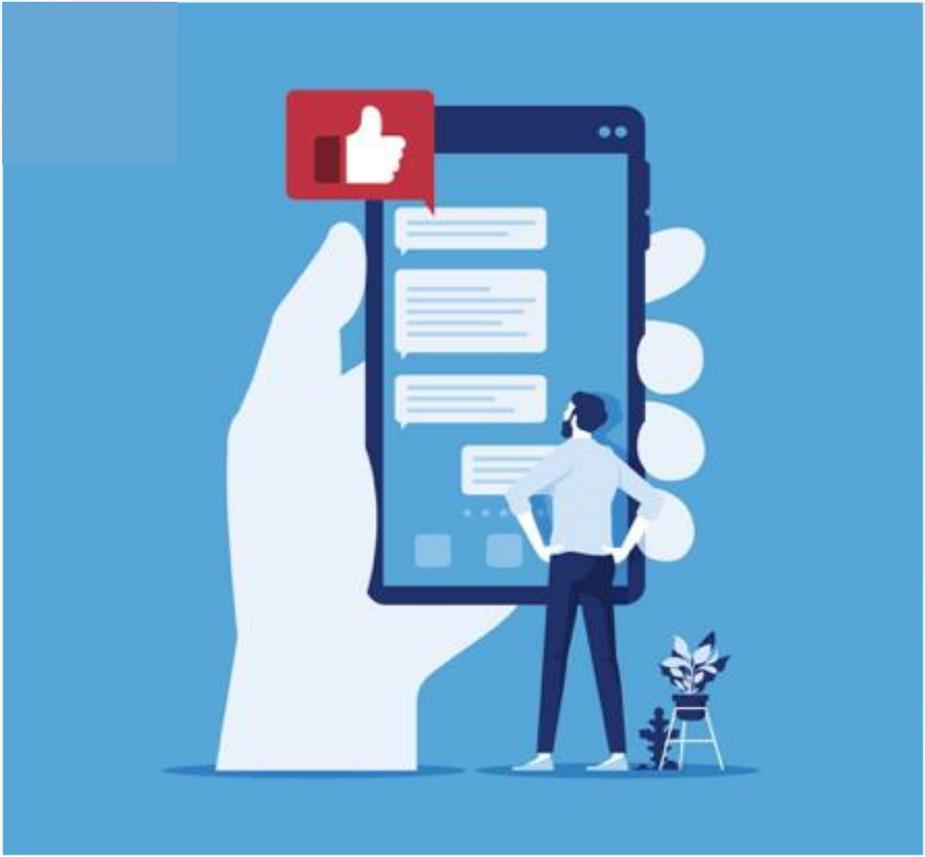
CEREBRAL VENOUS SINUS THROMBOSIS

CVST PRESENTATION

- Incidence: 1/10,000, within the first two weeks postpartum.
- **Progressive headaches, increasing over time /** thunderclap more rarely, bilateral, diffuse, often **increased when lying down**
- Nausea, vomiting, focal neurological signs, seizures or loss of consciousness, coma

- Mechanism: venous stasis, endothelial damage of cortical veins (sudden changes in ICP during delivery), hypercoagulability in pregnancy





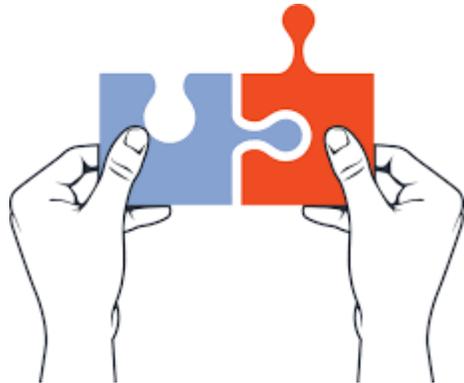
Major Neurologic Complications Associated With Postdural Puncture Headache in Obstetrics: A Retrospective Cohort Study

Jean Guglielminotti, MD, PhD,* Ruth Landau, MD,* and Guohua Li, MD, DrPH*† 2019



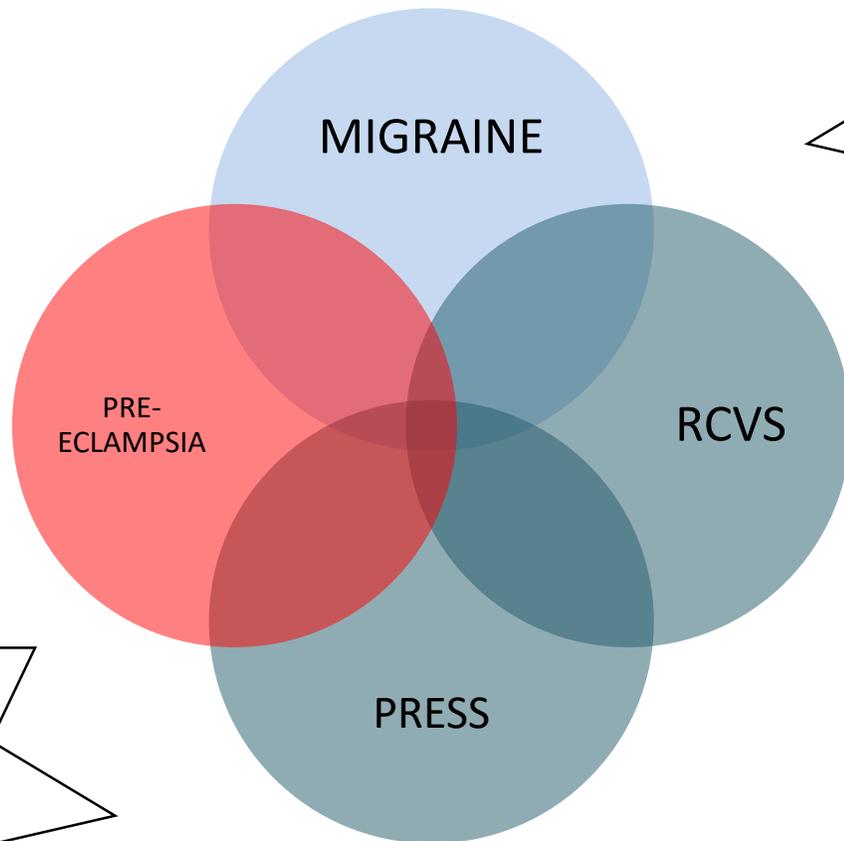
Table 2. Maternal Complications in Women With and Without PDPH in the 1,003,803 Women Who Received Neuraxial Anesthesia During Labor and Delivery in New York State Hospitals, Between January 2005 and September 2014

	No PDPH (N = 998,995)		PDPH (N = 4808)		P Value ^a	Crude OR (95% CI)
	N	Incidence (per 1000; 95% CI)	N	Incidence (per 1000; 95% CI)		
Major neurologic complications						
Cerebral venous thrombosis and nontraumatic subdural hematoma	164	0.16 (0.14–0.19)	15	3.12 (1.75–5.14)	<.001	19.06 (11.23–32.37)
Cerebral venous thrombosis	145	0.15 (0.12–0.17)	— ^b	≈1.66 (0.72–3.28)	<.001	11.48 (5.63–23.41)
Nontraumatic subdural hematoma	19	0.02 (0.01–0.03)	— ^b	≈1.46 (0.59–3.00)	<.001	76.66 (32.21–182.44)
Bacterial meningitis	21	0.02 (0.01–0.03)	— ^b	≈0.83 (0.23–2.13)	<.001	39.61 (13.59–115.43)
Other complications						
Depression	3732	3.74 (3.62–3.86)	38	7.90 (5.60–10.83)	<.001	2.12 (1.54–2.93)
Headache and migraine	3771	3.77 (3.66–3.90)	149	30.99 (26.27–36.29)	<.001	8.44 (7.15–9.97)
Low back pain	1707	1.71 (1.63–1.79)	40	8.32 (5.95–11.31)	<.001	4.90 (3.58–6.71)



A

ASSOCIATION



Change of blood
brain barrier
permeability

Abnormal
cerebral
autoregulation

Endothelial
dysfunction

CLINICAL CASE 3

○ **Mrs M: Caesarean section for dystocic labour. History of migraines**

• **Day 1:**

- fluctuating **neck pain**
- bilateral **hearing loss**
- **oedema of lower limbs**



• **Day 5:**

- Worsening of neck pain
- evolving into **thunderclap headache, sometimes pulsating**
- **BP 175/85**
- → suspicion of post partum PE: introduction of MgSo₄



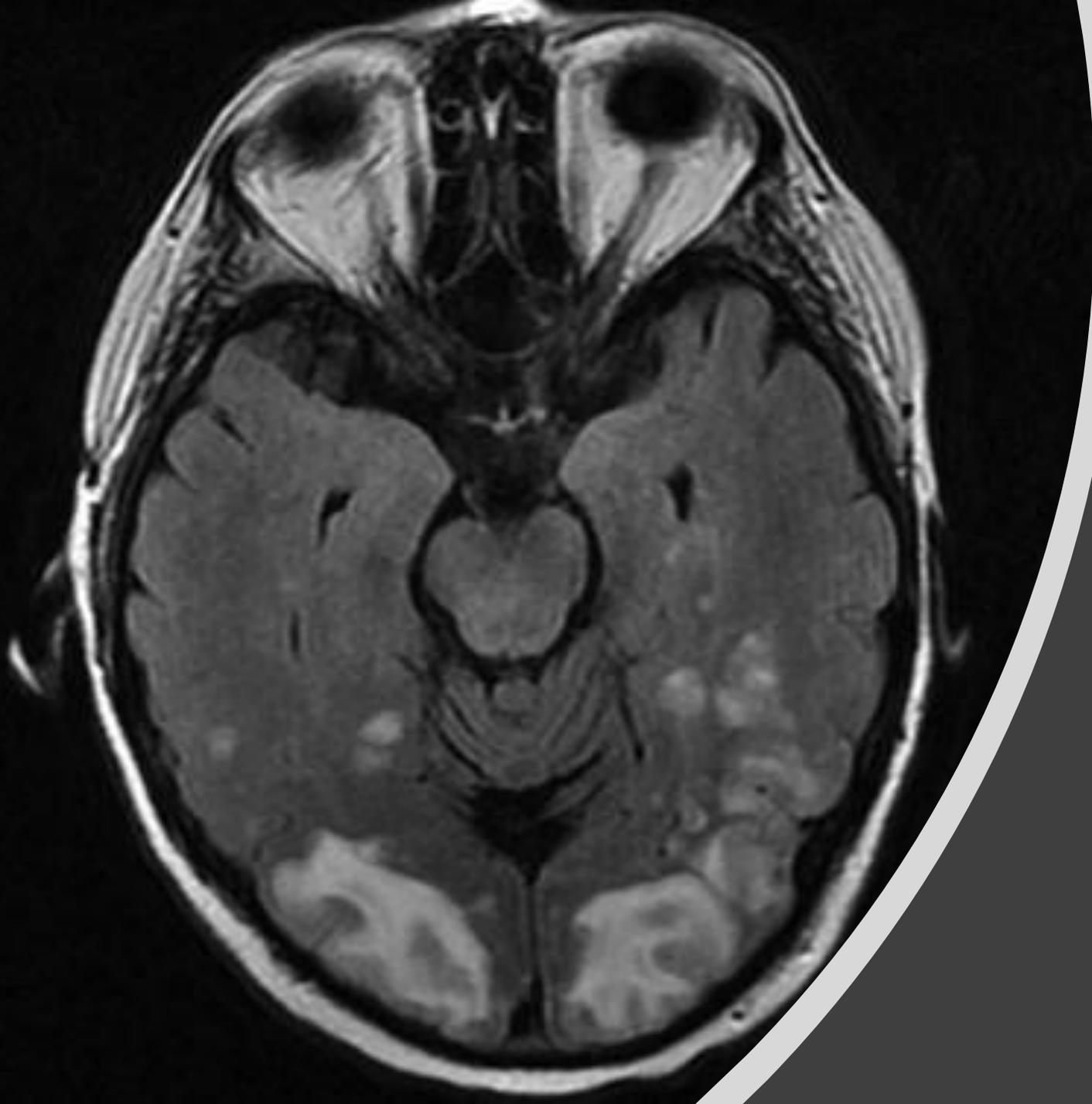
CLINICAL CASE 3

- **Angio-CT:**

- **Dissections of the bilateral vertebral arteries** and dissection of the extracranial left internal carotid artery

- **MRI:**

- **Multiple hypersignals** in the grey and white matter, predominantly bitemporal, but also in the frontal, parietal and occipital lobes, consistent with **PRES.**



POSTERIOR
REVERSIBLE
ENCEPHALOPATHY
SYNDROME (PRES)

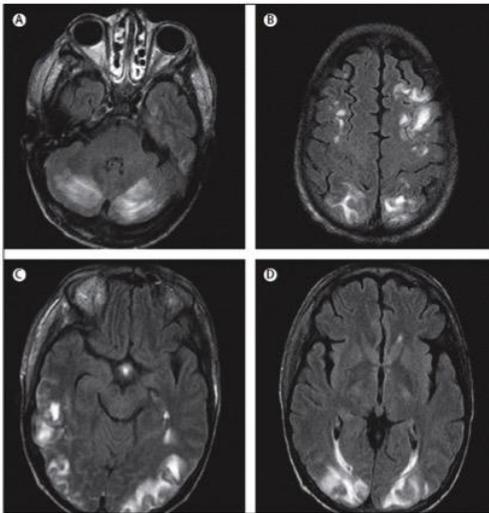
CLINIC PRES

Severe, diffuse and progressive headache

Associated with visual signs (40%): cortical blindness, homonymous hemianopsia, phosphenes, blurred vision, visual hallucinations, visual neglect, convulsions, confusion

Mechanism:

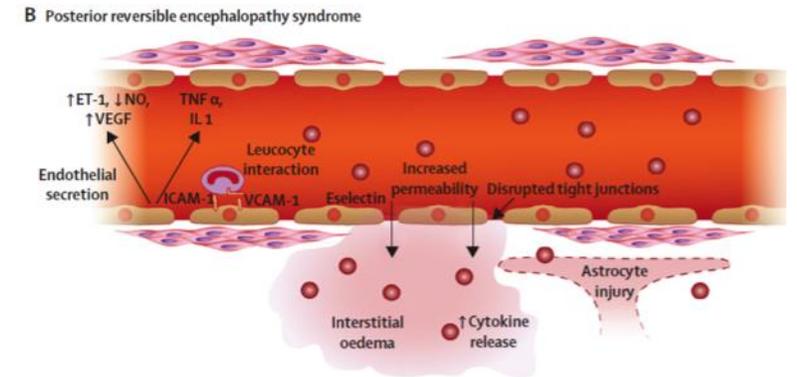
- Loss of cerebral autoregulation in the **posterior region** (less myogenic vasoconstriction of A and arterioles)
- Reversible vasogenic parieto-occipital edema



CT: Vasogenic oedema

MRI: T2 FLAIR:

- **T2 hyperintense white/grey** substance lesions
- **Bilateral**, asymmetrical **subcortical vasogenic oedema**



CLINICAL CASE 3

○ Evolution:

- D7: recurrent severe headaches.



- New cerebral MRI: irregularities of caliber of the intracranial arteries that may suggest an **overlapping PRES -reversible vasoconstriction syndrome**
- Final diagnosis of reversible vasoconstriction syndrome



A SSOCIATION

Overlap of pathologies

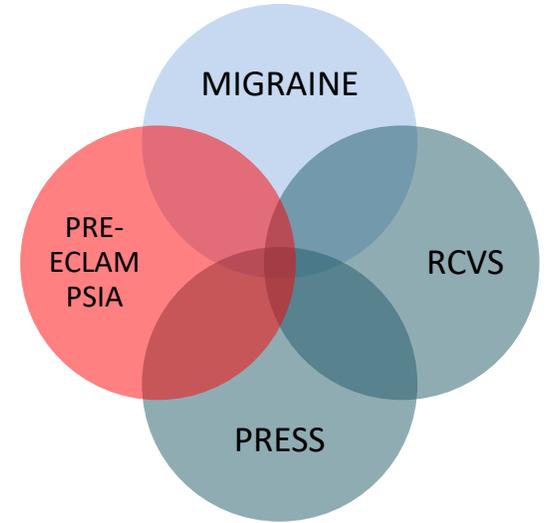


Migraine

Pre-eclampsia

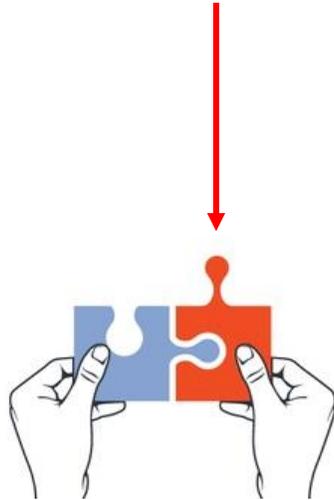


**Migraine increases the risk of PE
OR 1.8-3.5**



A SSOCIATION

Overlap of pathologies

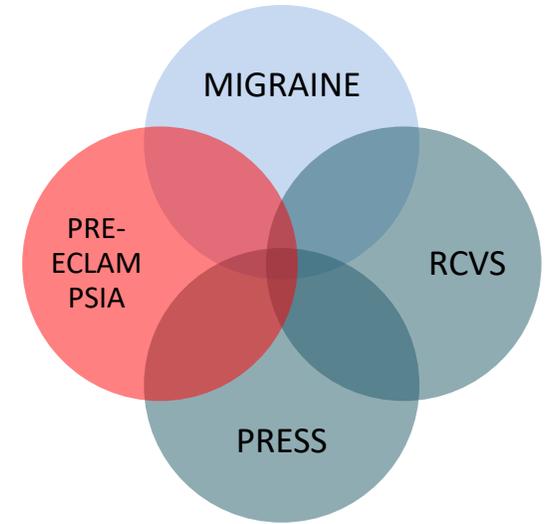


Migraine

RCVS

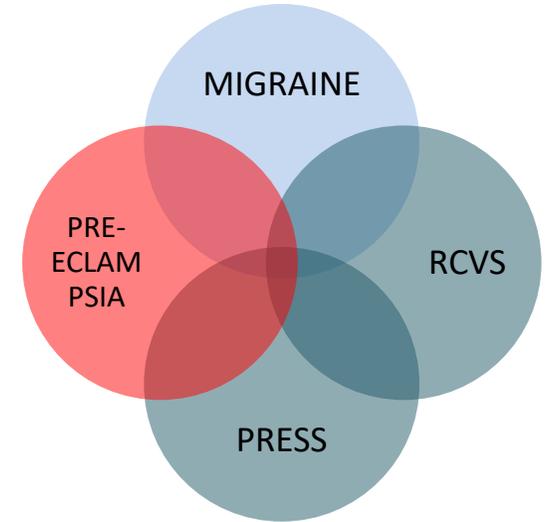
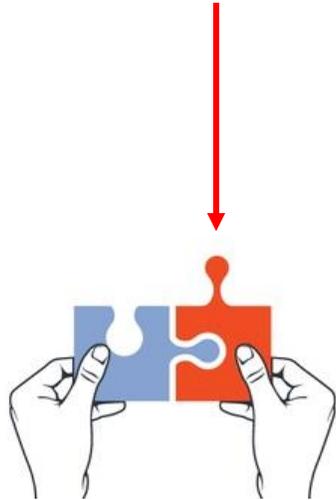


- Triptans, ergot alkaloid derivatives = precipitating factors of RCVS
- Migraine → risk of hemorrhagic complication in RCVS: OR 2.34



A SSOCIATION

Overlap of pathologies



PRES

RCVS



- **Very frequent (>85%: PRES = RCVS like)**
- PRESS in RCVS 8-39%.

Dodick DW. Cephalgia 2003
Ducros A. Lancet Neurol 2012
Ducros A. Brain 2007
Fugate JE. Stroke 2012
Ducros A Lancet Neurol 2013

Last point!!



Which diagnoses can be missed by a CT scan?

CSF leak

Which diagnoses can be missed by a CT scan?

CSF leak

PRES

Which diagnoses can be missed by a CT scan?

CSF leak

PRES

RCVS

Which diagnoses can be missed by a CT scan?

CSF leak

PRES

RCVS

**Cerebral venous
sinus thrombosis**

Which diagnoses can be missed by a CT scan?

CSF leak

PRES

RCVS

**Cerebral venous
sinus thrombosis**

Mengoencephalitis

Which diagnoses can be missed by a CT scan?

CSF leak

PRES

RCVS

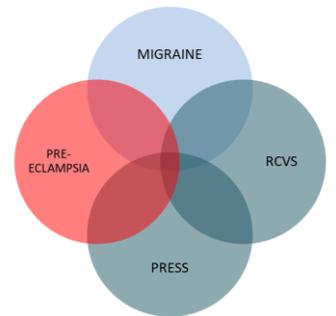
**Cerebral venous
sinus thrombosis**

Meningoencephalitis

Pituitary apoplexy

CONCLUSION: Take home message

1. Most headaches are benign, but some are more unusual and potentially the most serious
2. Know the clinical presentations of potentially serious neurological causes
3. Think about the association of pathologies
4. In case of red flag : ask for neurological advice + imaging (CT in emergency and at best MRI/MRA)
5. Do regular and prolonged follow-up of patients who have had secondary headaches, especially in the case of PDPH



Thank you for your attention

hoping I haven't given you too many post power point headaches....

