INTRACRANIAL ANEURYSM AND SUBARACHNOID HEMORRHAGE

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INTRODUCTION

- The overall worldwide incidence of aSAH is ≈6.1 per 100000 person-years,
- Highest incidence in Japan and Finland at 28 and 16.6 per 100 000 person-years,
- aSAH is a severely morbid and often deadly condition. Prehospital mortality rates from aSAH have been reported to be 22% to 26%.
- hospital inpatient mortality rates 19%–20% in 2021 [global]

JAMA Neurol. 2019;76:588–597.

INTRACRANIAL ANEURYSM AND SUBARACHNOID HEMORRHAGE

- **10%† BEFORE RECEIVING TR/ (due to intraventricular extension of hemorrhage and acute pulmonary edema.)**

- **Emergency Dep/ NICU :**
  - **1/3 poor grade (4,5) ⇒ 50%† within 3 months**
  - **1/3 neurologic deterioration ⇒ morbidity, mortality**
  - **1/3 chance of good recovery**

GRADING SYSTEM of SAH

- **PROGNOSIS SAH ≅ CONSCIOUSNESS + NEUROLOGICAL DEFICIT, indicator of severity brain injury (caused by increase ICP)**
- **World Federation of Neurologic Surgeons (WFNS).**
- **Hunt and Hess.**
- **GRADE 1,2,3 →CANDIDATES FOR EARLY SURGERY :**
  - **Rebleeding : first day 4%, 2 weeks 25%, following months 30-50%; mortality rate > 50%, morbidity 20-25%**
  - **delayed cerebral arterial vasospasm**
  - **Hydrocephalus**

GRADING SYSTEM of SAH

- **MORTALITY LATE SURGERY(7-10 days) SURGERY : twice.**
- **Grade 4 & 5 : may be candidates for aneurysm treatment as long as they do not have irrecoverable and devastating neurological injury.**
- **Despite an initial poor prognosis, 39-40% of patients achieved a favorable outcome.**
- **Patient with INTRAPARENCHYMAL & INTRAVENTRICULAR BLEEDING may need EARLY decompression.**

2023 Guideline for the Management of Patients With Aneurysmal Subarachnoid Hemorrhage: A Guideline From the American Heart Association/ American Stroke Association

GRADING SYSTEM HUNT & HESS

Grade	Description
0	Unruptured
1	Asymptormatic or mild headache/nuchal rigidity
2	Cranial nerve palsy, moderate nuchal rigidity/ Headache
3	Mild focal deficit, lethargy, or confusion
4	Stupor, moderate hemiparesis, early decerebrate rigidity
5	Deep coma, decerebrate, moribund

one grade is added for severe systemic disease or vasospasm on arteriography

Grading System World Federation of Neurological Surgeons

WFNS	Glasgow coma	
grade	scale score	Motor deficit
I	15	ABSENT
II	14-13	ABSENT
III	14-13	ABSENT OR PRESENT
IV	12-7	ABSENT OR PRESENT
V	6-3	PRESENT

THE ROLE OF CT in SAH

- **FIRST DIAGNOSTIC IMAGING FOR SAH**, because of its : HIGH SENSITIVITY, AVAILABILITY, RELATIVELY LOW COST, FAST & EASY MONITORING FOR SICK PATIENT.
- POTENTIALLY DETECT THE **CAUSE** OF SAH
- ABILITY TO **LOCALIZE** THE LOCATION OF ANEURYSM
- EVALUATE THE **AMOUNT** OF SAH / FISHER GROUP SYSTEM TO PREDICT COMPLICATIONS AND OUTCOME
- **NEW TECHNIQUES** : CTA, CT PERFUSION

HIGH SENSITIVITY OF CT FOR SAH

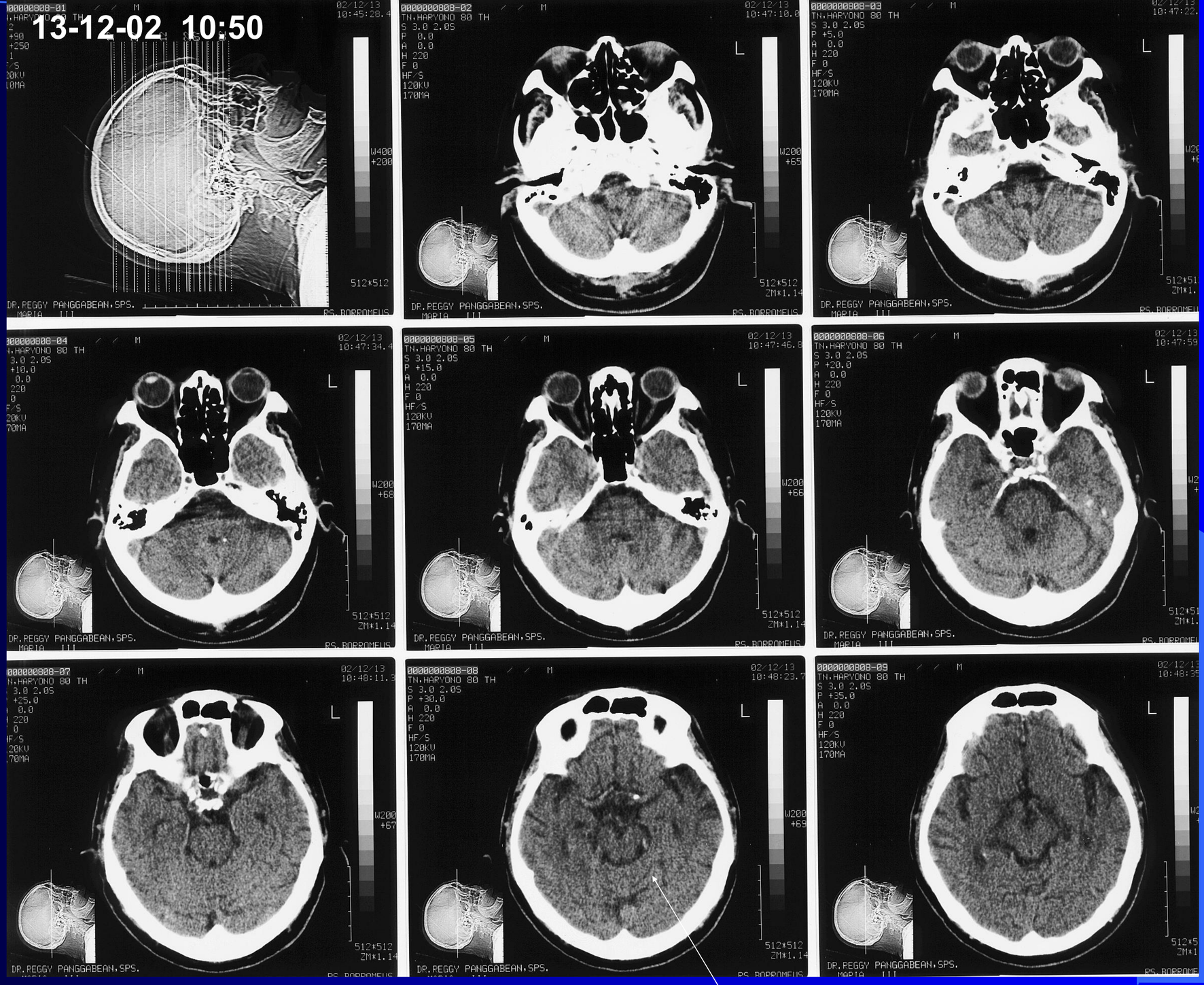
- DEPEND ON TIME AND HEMATOCRIT
  - WITHIN 6 HOURS : SENSITIVITY approaching 100%.
  - 24 HOURS: 2-5% “WASHED OUT”
  - 3 DAYS : 90%
  - 7 DAYS : 50%
  - 10 DAYS : NEGATIVE
  - Hb < 10 GR% : NEGATIVE
- NEGATIVE CT SCAN WITH STRONGLY SUSPECTED SAH: carefully scrutinized for subtle signs of subarachnoid blood. IF NEGATIVE – LUMBAR PUNCTURE !!!, because of high mortality and morbidity with SAH

PITFALLS in DIAGNOSIS of SAH

- HIGH DENSITY OF DURAL, VASCULAR AND BONY STRUCTURES > FALSE + DIAGNOSIS
- VERY IMPORTANT : CT WITH THIN SLICES : 2-3 MM
- APPROPRIATE WINDOW SETTING

Reasons for failure to Recognize SAH on CT Scans

- Blood in prepontine cistern (may not be visualized) Blood in one part of the pentagon (may not be visualized from tilting of the gantry)
- Absent unilateral sylvian fissure from isodense SAH
- Sedimentation of blood in dependent part of the posterior ventricular horns
- Blood in basal cisterns misinterpreted as contrast enhancement
- Blood on tentorium misinterpreted as calcification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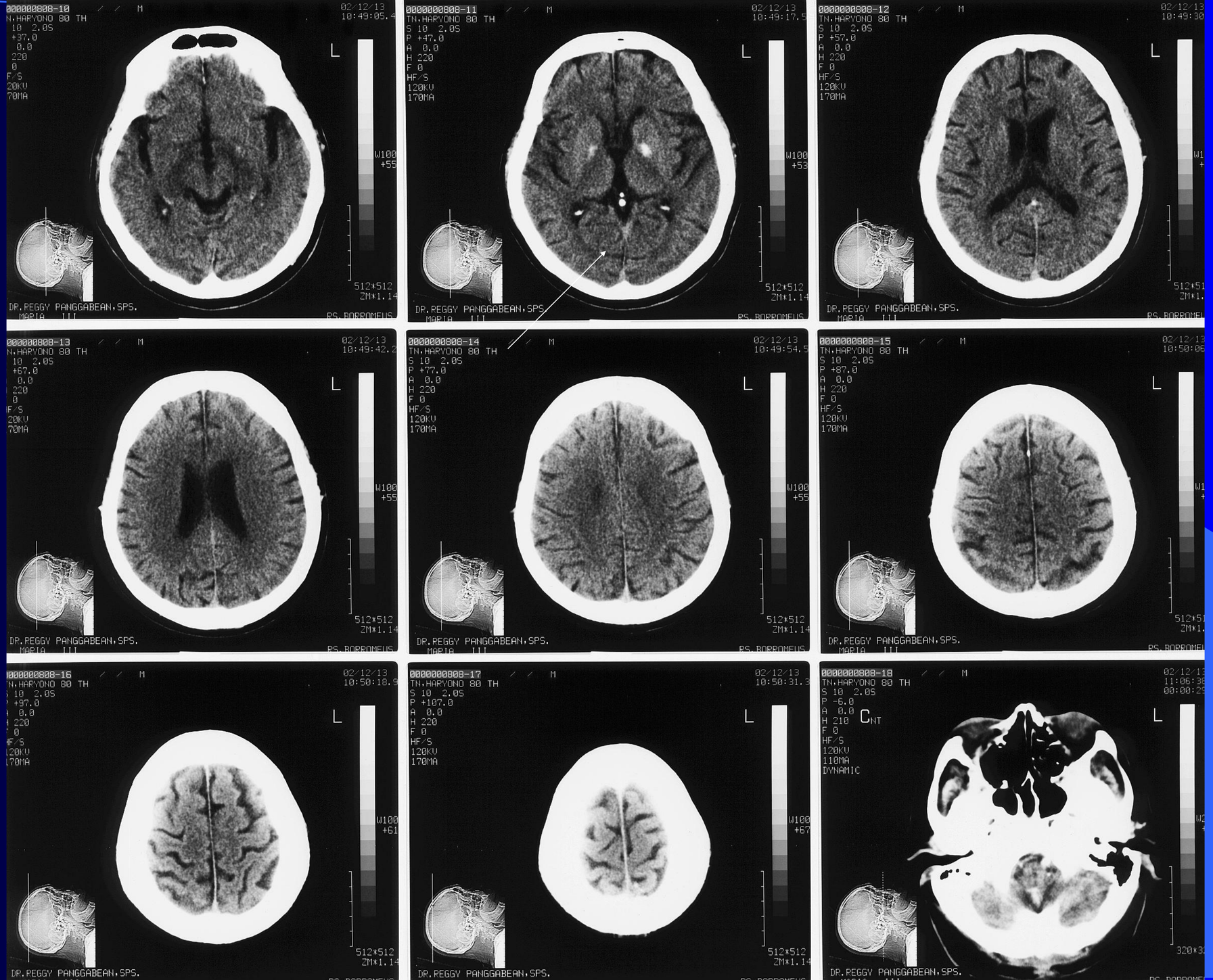
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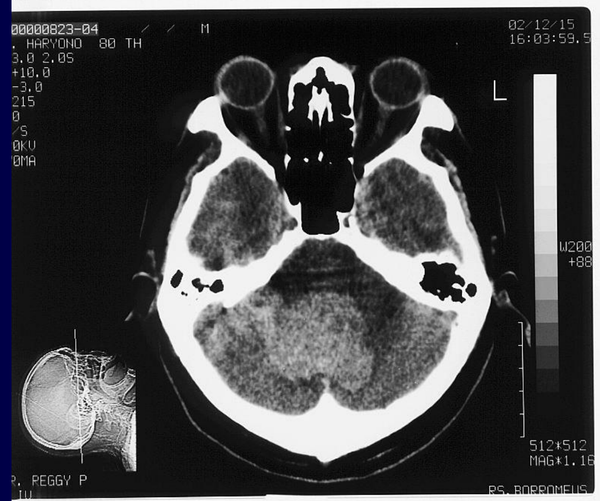
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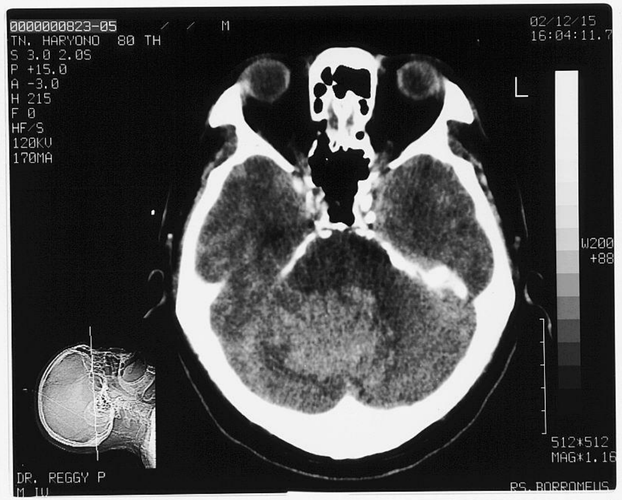
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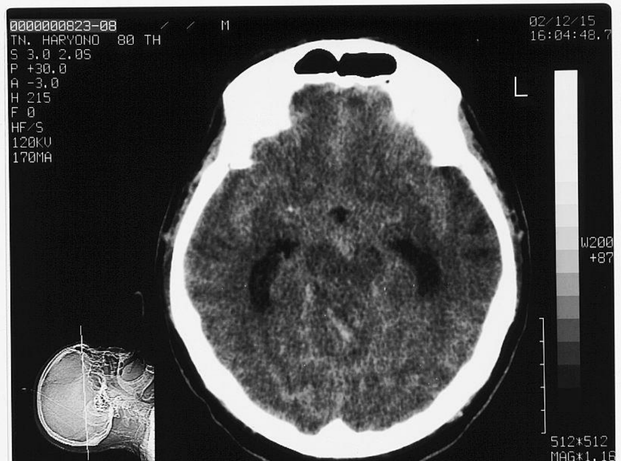
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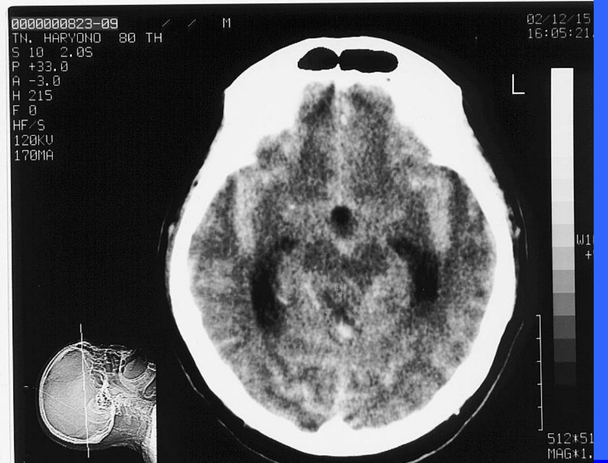
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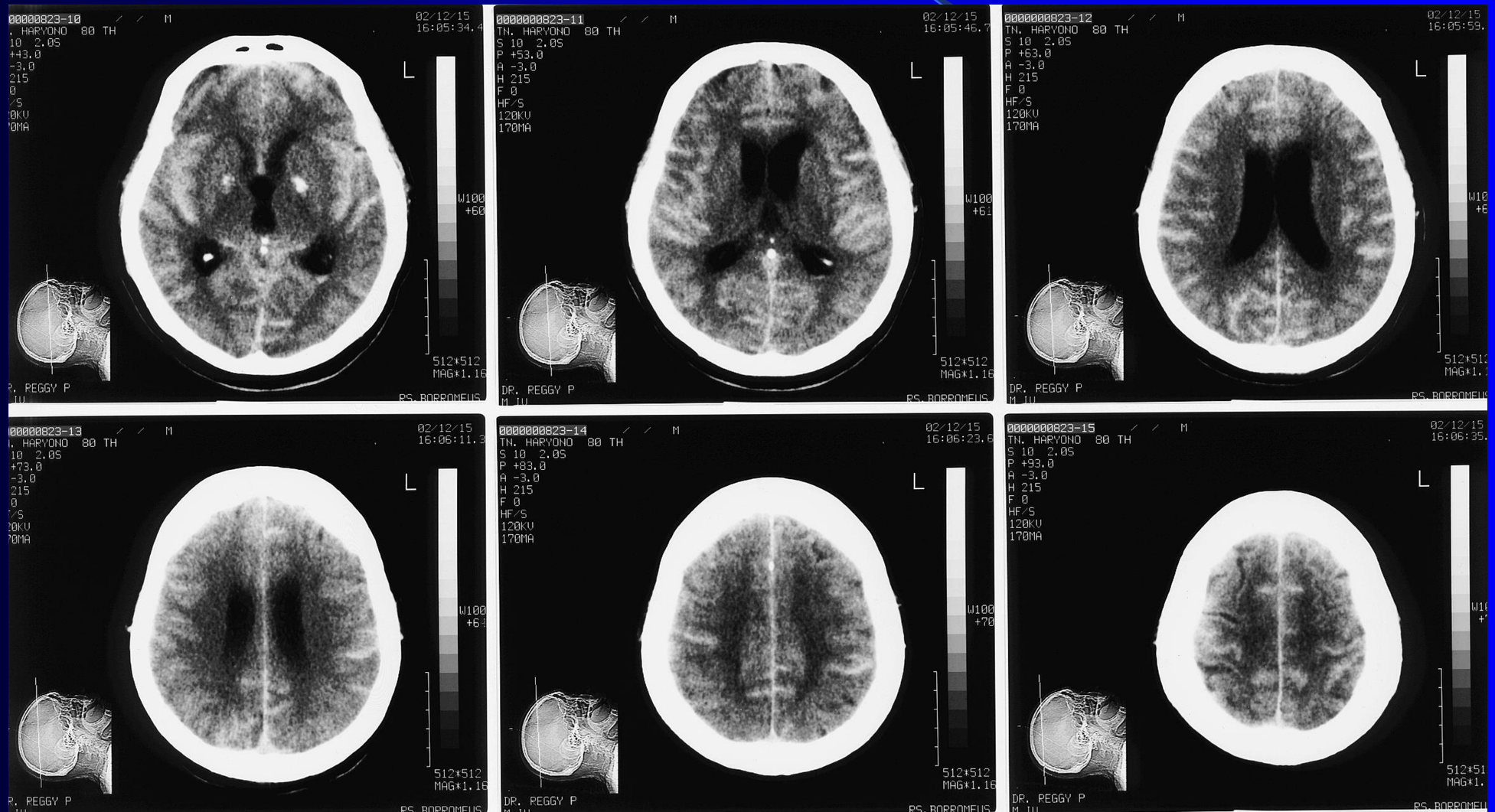
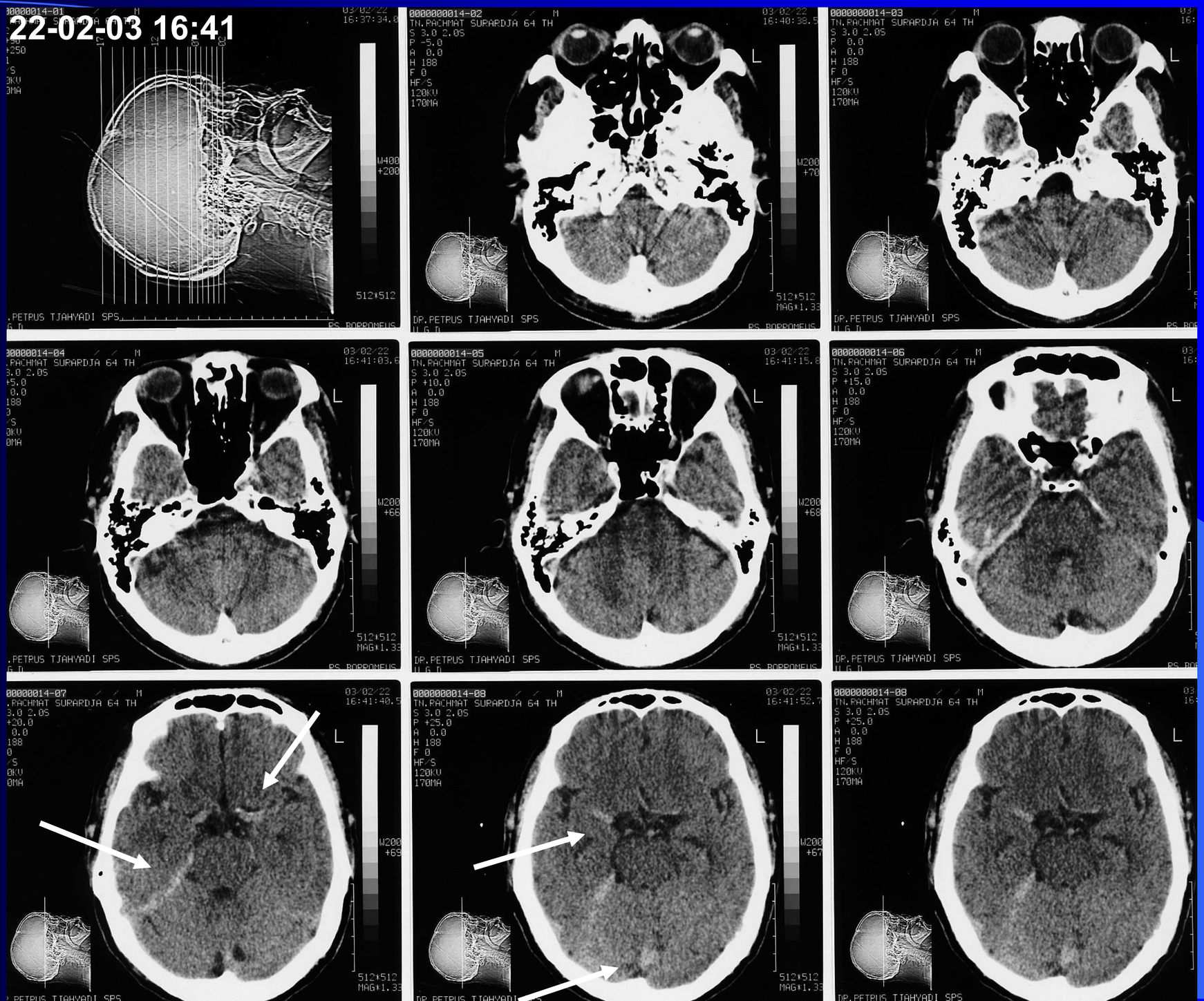
REBLEEDING ON THIRD
SAH + IVH + I CBL H

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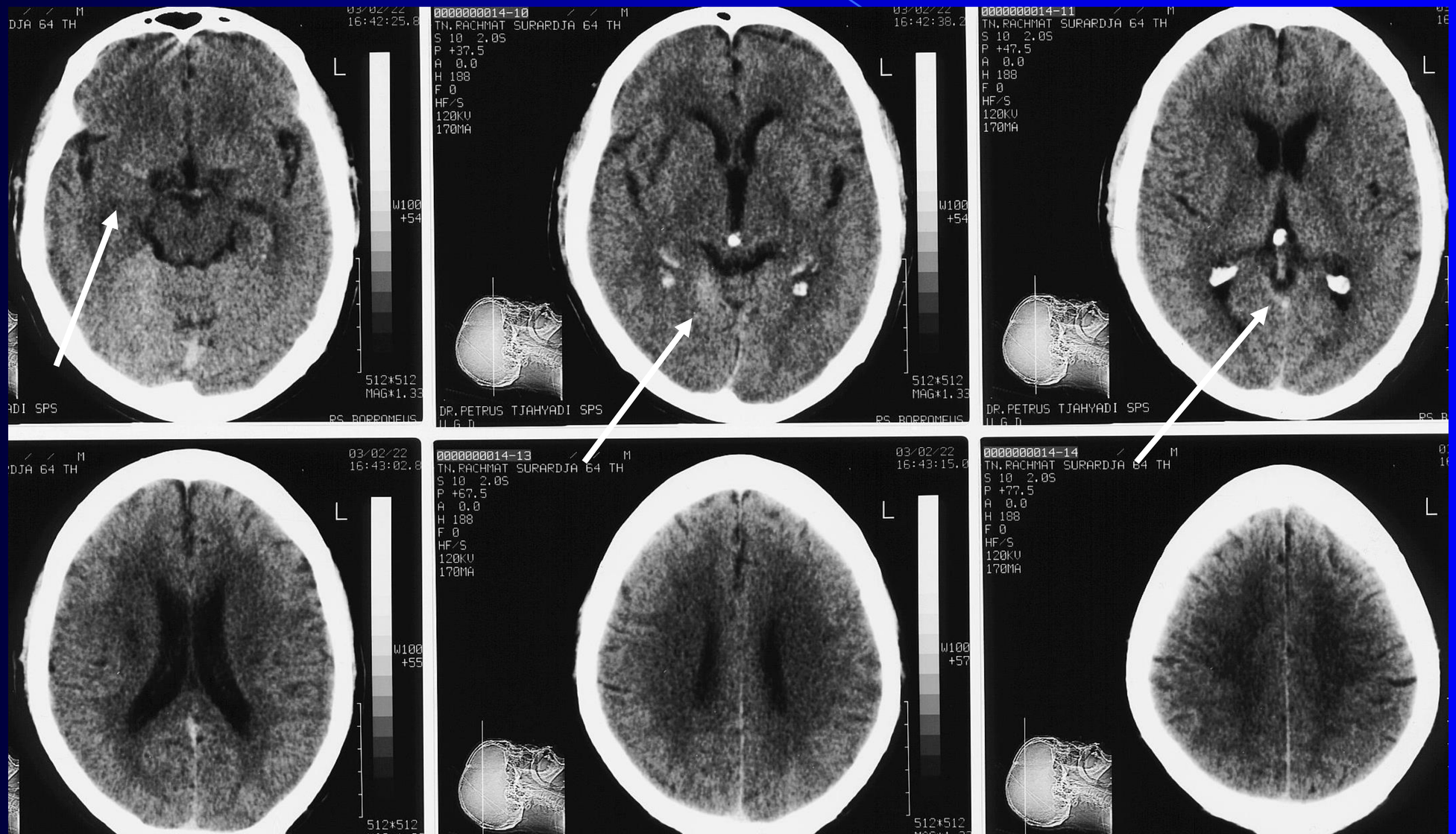
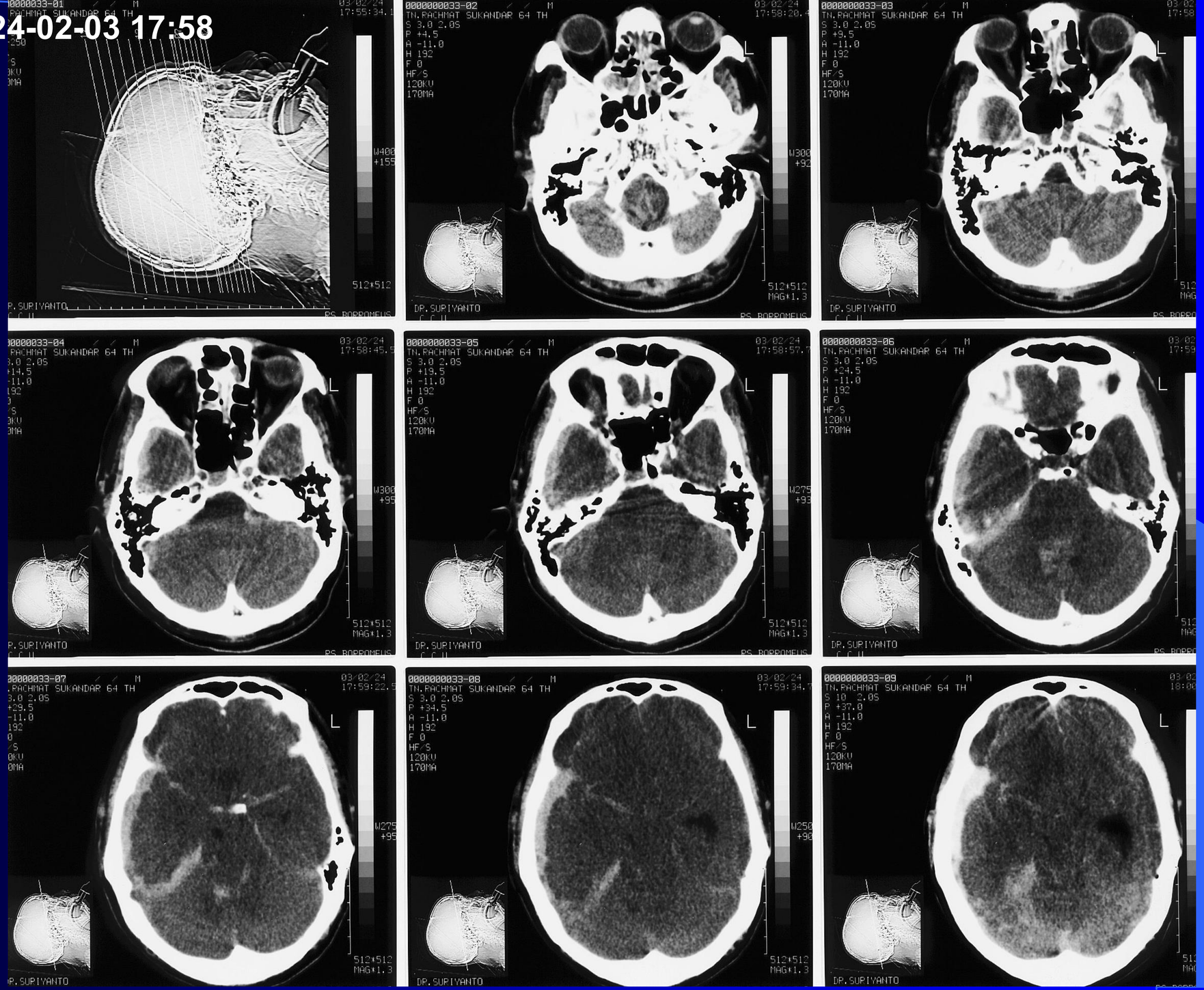
YOU MUST KNOW WHERE TO LOOK

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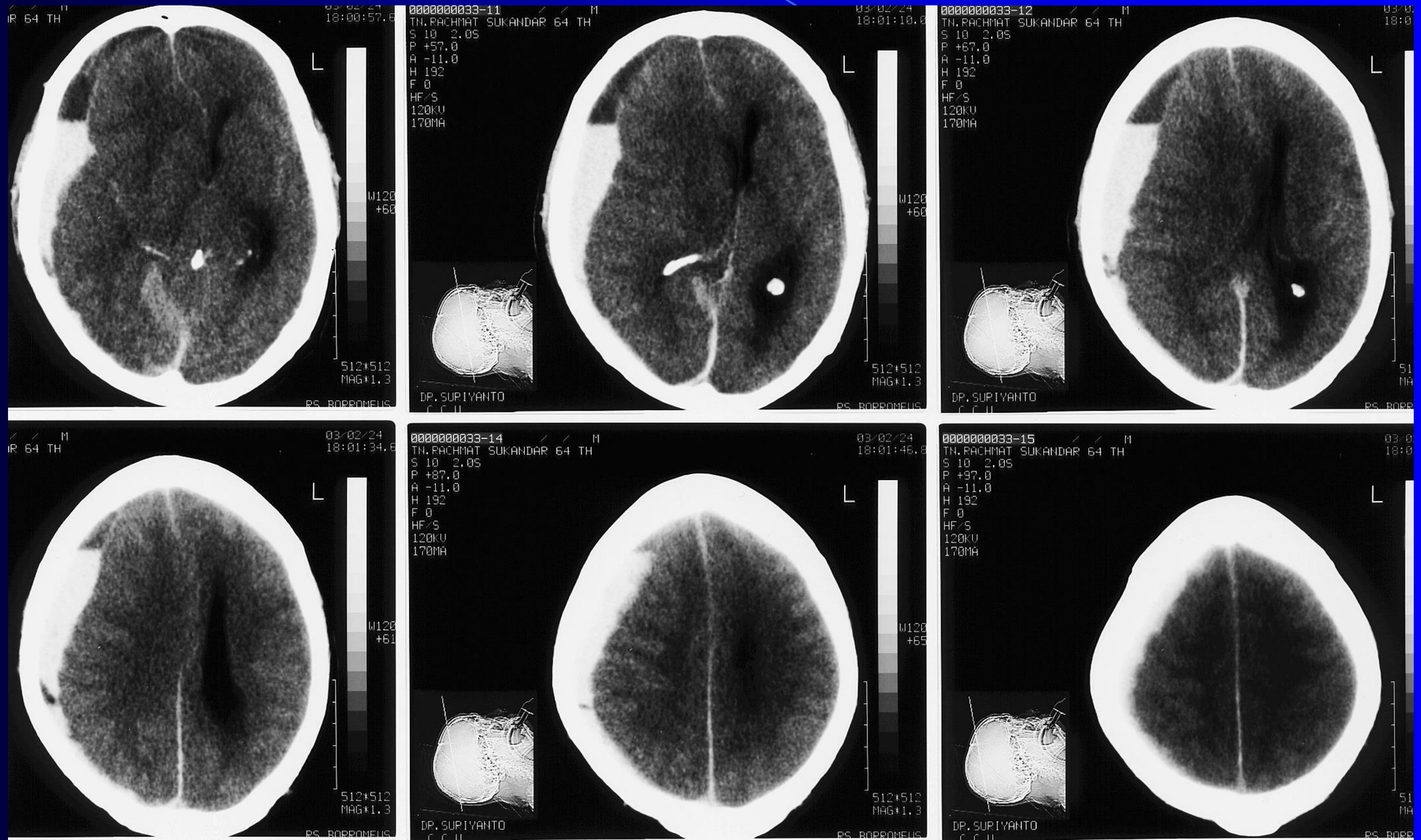
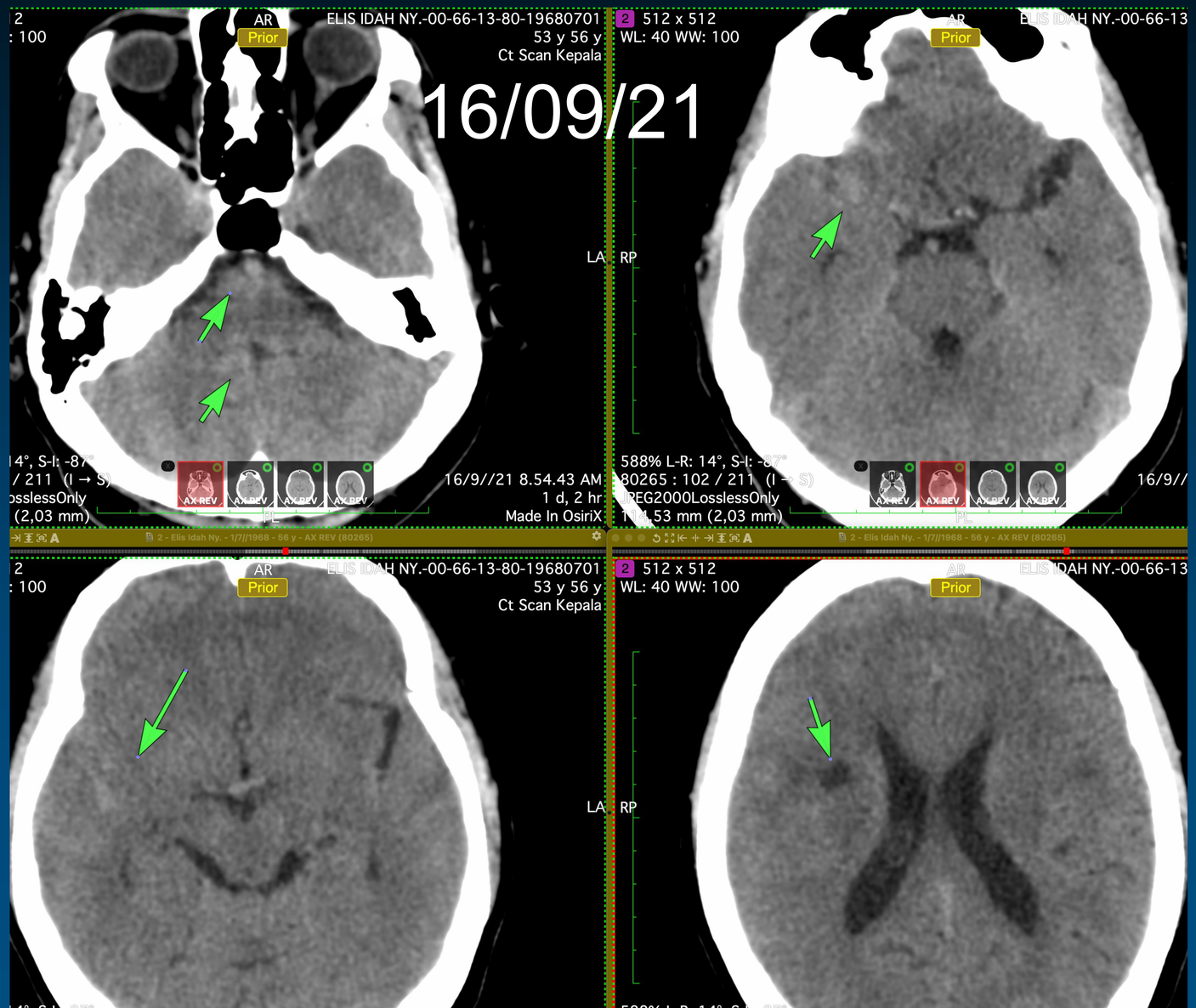
REBLEEDING: SAH + IVH + SUBDURAL H



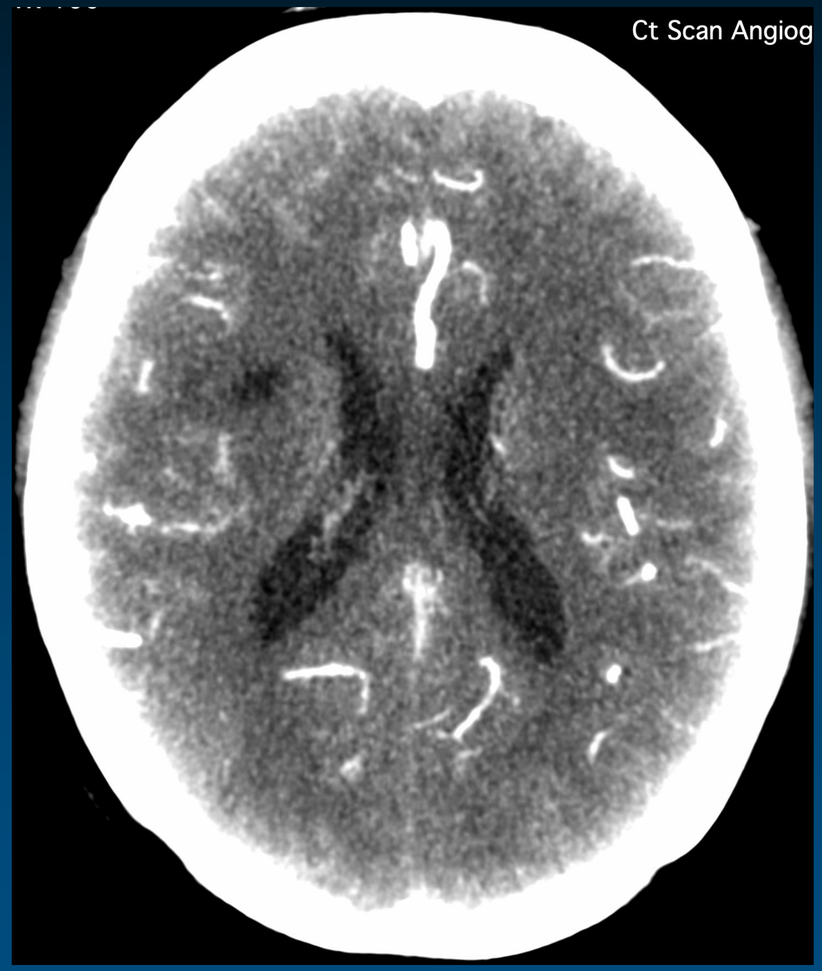
severe headache (± 1 week).

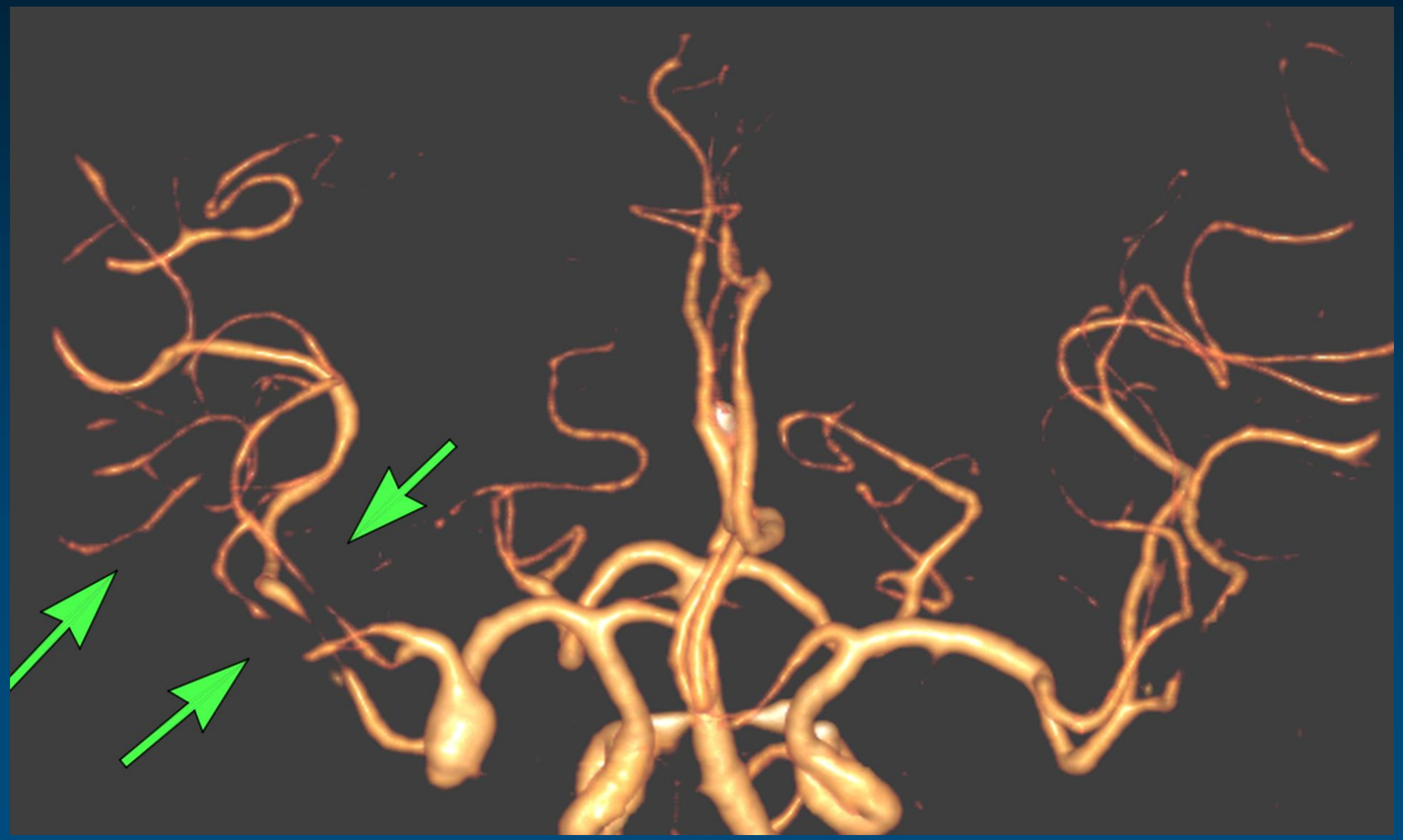


- **WITHIN 6 HOURS : SENSITIVITY approaching 100%.**
- **24 HOURS: 2-5% “WASHED OUT”**
- **3 DAYS : 90%**
- **7 DAYS : 50%**
- **10 DAYS : NEGATIVE**

VASOSPASM & WATERSHED INFARCTION

- 17/09/21

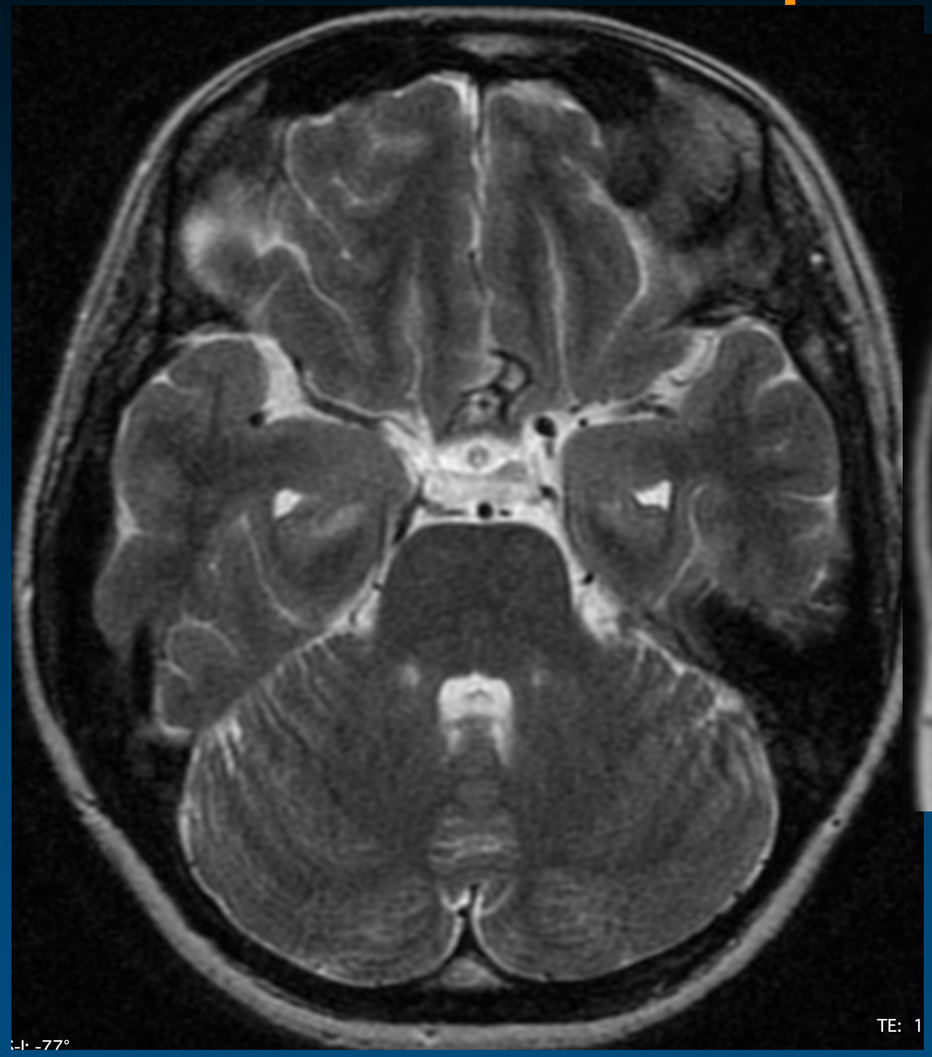


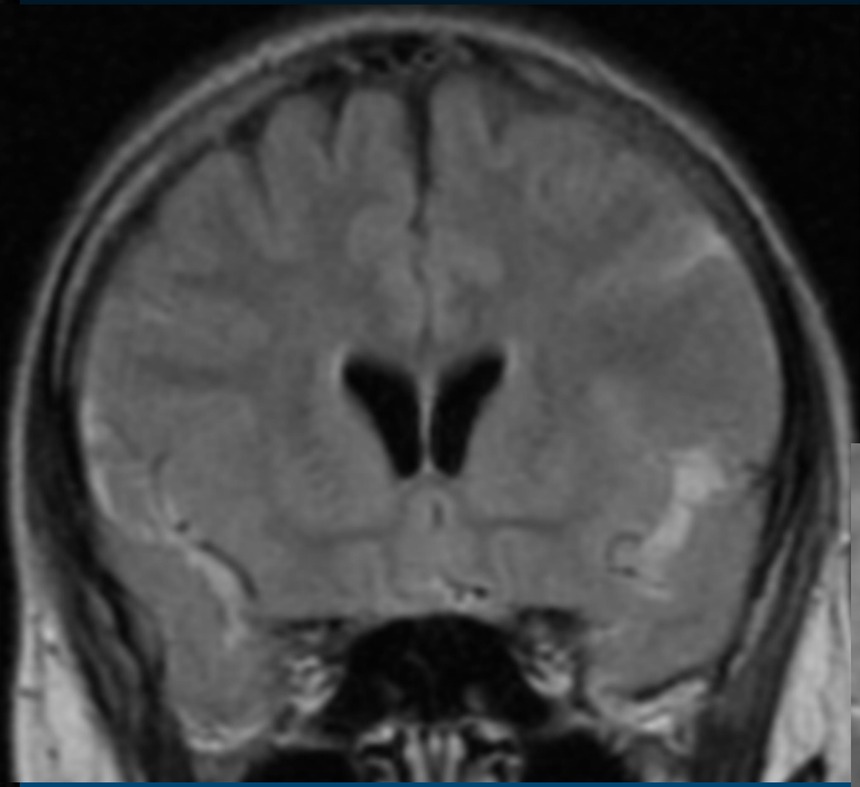


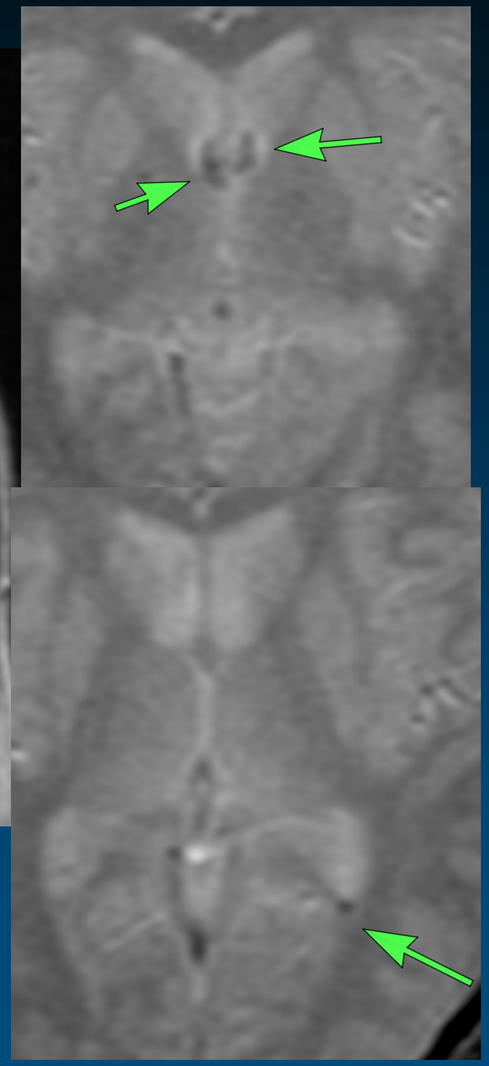
THE ROLE OF MRI in SAH

- MRI is sensitive to subarachnoid blood and is able to visualize it well in the first 12 hours, typically as a hyperintensity in the subarachnoid space on FLAIR
- Susceptibility-weighted sequences are also exquisitely sensitive to blood products.
- MR angiography and MR venography are also able to detect a causative aneurysm or another source of bleeding.
- diffusion weighted imaging may demonstrate early ischemic changes and delayed ischemia.

sudden cephalgia, MRI < 6 HOUR





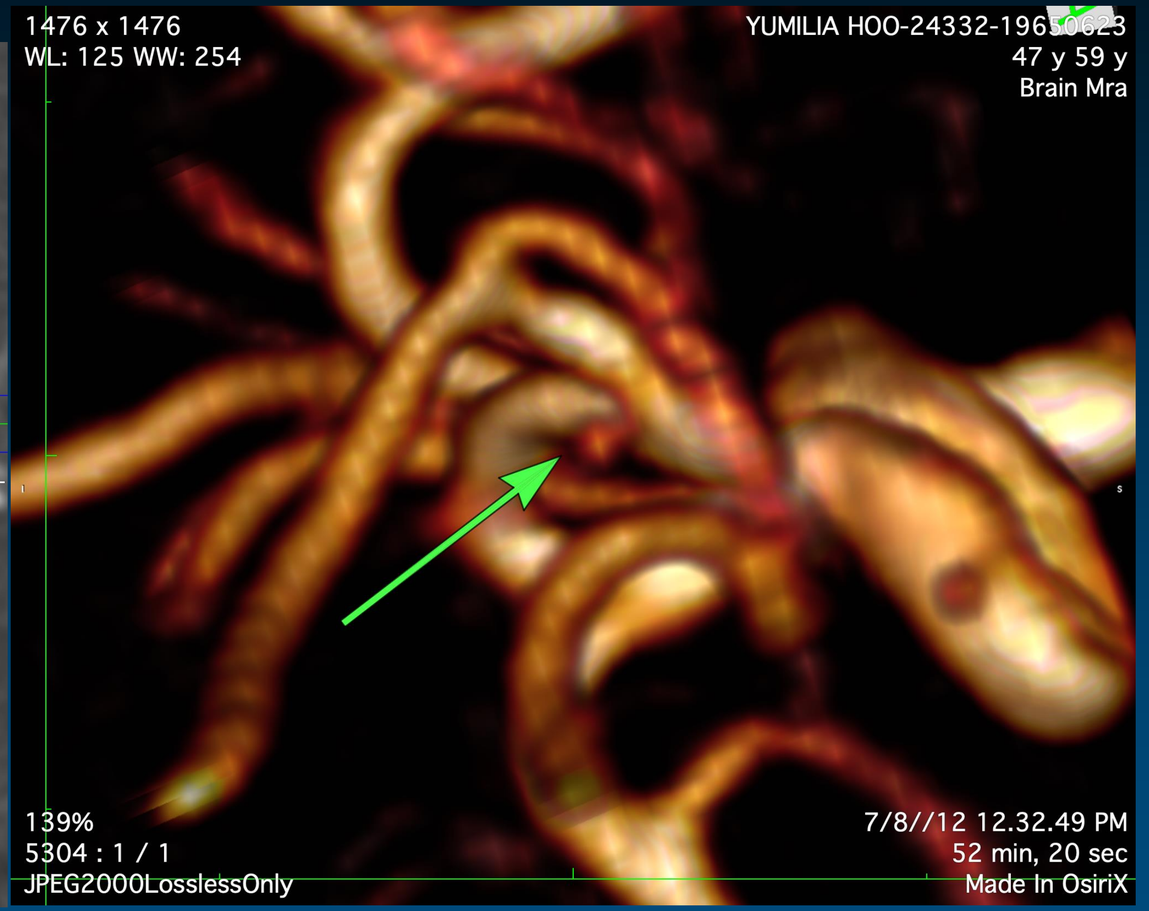


T2W

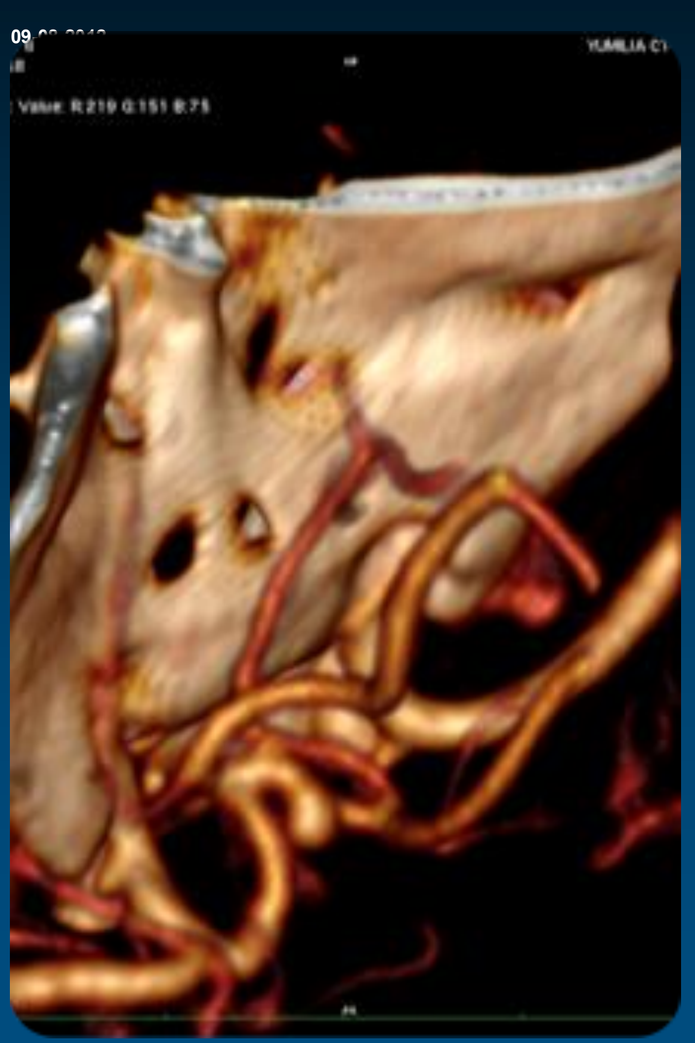
T2W FLAIR

T2* GRE

sudden cephalgia, MRI < 6 HOUR



22-8-2012 after two weeks imminent rupture



CONCLUSION

- aSAH is a severely morbid and often deadly condition. Prehospital mortality rates from aSAH have been reported to be 22% to 26%. Hospital inpatient mortality rates 19%–20% in 2021 [global]
- **PROGNOSIS SAH ≅ CONSCIOUSNESS + NEUROLOGICAL DEFICIT+ EARLY DIAGNOSIS AND SURGERY**
  - **Rebleeding : first day 4%, 2 weeks 25%, following months 30-50%; mortality rate > 50%, morbidity 20-25%**
  - **delayed cerebral arterial vasospasm**
  - **Hydrocephalus**
- **GRADING SYSTEM: WFNS & Hunt and Hess.**
- **GRADE 1,2,3 →CANDIDATES FOR EARLY SURGERY**
- **SENSITIVITY OF CT DEPEND ON TIME AND HEMATOCRITM IF NEGATIVE – LUMBAR PUNCTURE.**
- **PAY ATTENTION TO PITFALLS in DIAGNOSIS of SAH**

THANK YOU FOR YOUR ATTENTION