



# PSEUDO-SUBARACHNOID HEMORRHAGE IN SPONTANEOUS INTRACRANIAL HYPOTENSION: A POTENTIAL DIAGNOSTIC PITFALL.



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**INTRODUCTION** Spontaneous intracranial hypotension (SIH) results from single or multi CSF leaks at spine level mainly in the cervical or upper thoracic regions and only rarely from skull base leakage. A progressive orthostatic bilateral headache worsened by Valsalva maneuver or head shaking is the main and most common symptom.[1] **Pseudo-subarachnoid haemorrhage (PseudoSAH)** is a rare brain CT finding mimicking SAH.[2]

**CASE REPORT** We report the case of a patient with subacute progressive headache whose first brain CT scan was suggestive of subarachnoid hemorrhage which instead had spontaneous intracranial hypotension.

## CASE REPORT

**EMERGENCY ROOM:** A 70 YEARS OLD MAN arrived for a persistent slowly progressive headache since 20 days. Pain was dull, occipitally localized with bilateral radiation to all head, sleep-disturbing, and resistant to common pain-killers.

**Past medical history:** previous traumatic Brown-Sequard syndrome with mild right hemiparesis and left hypoesthesia; obstructive sleep apnea (NIV treatment suggested, but not done); pulmonary embolism from deep venous thrombosis 1 year before. Warfarin therapy was ongoing.

**Neurological exam:** only previous right hemiparesis and left hypoesthesia.

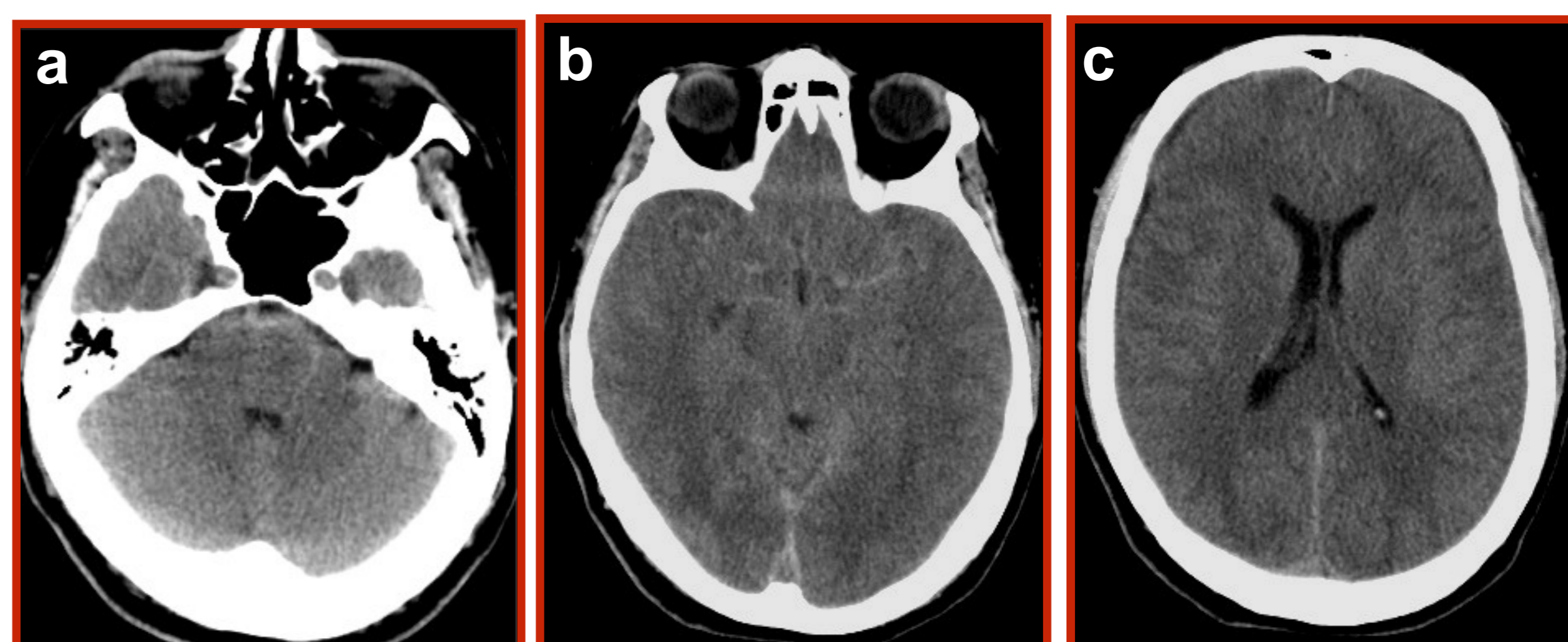
**Urgent exams:** INR: 2.43. **brain CT**, Fig.1: suspected SAH diagnosis. **Angio CT:** no aneurism/arteriovenous malformation.

**During hospitalization:** anticoagulation was promptly stopped. Progressive improvement after treatment with fluid replacement, paracetamol and caffeine.

**Brain & spine MRI**, Fig.2: no bleeding, diagnosis of SIH associated with meningeal diverticulatae, no fluid collection in perivertebral soft tissues.

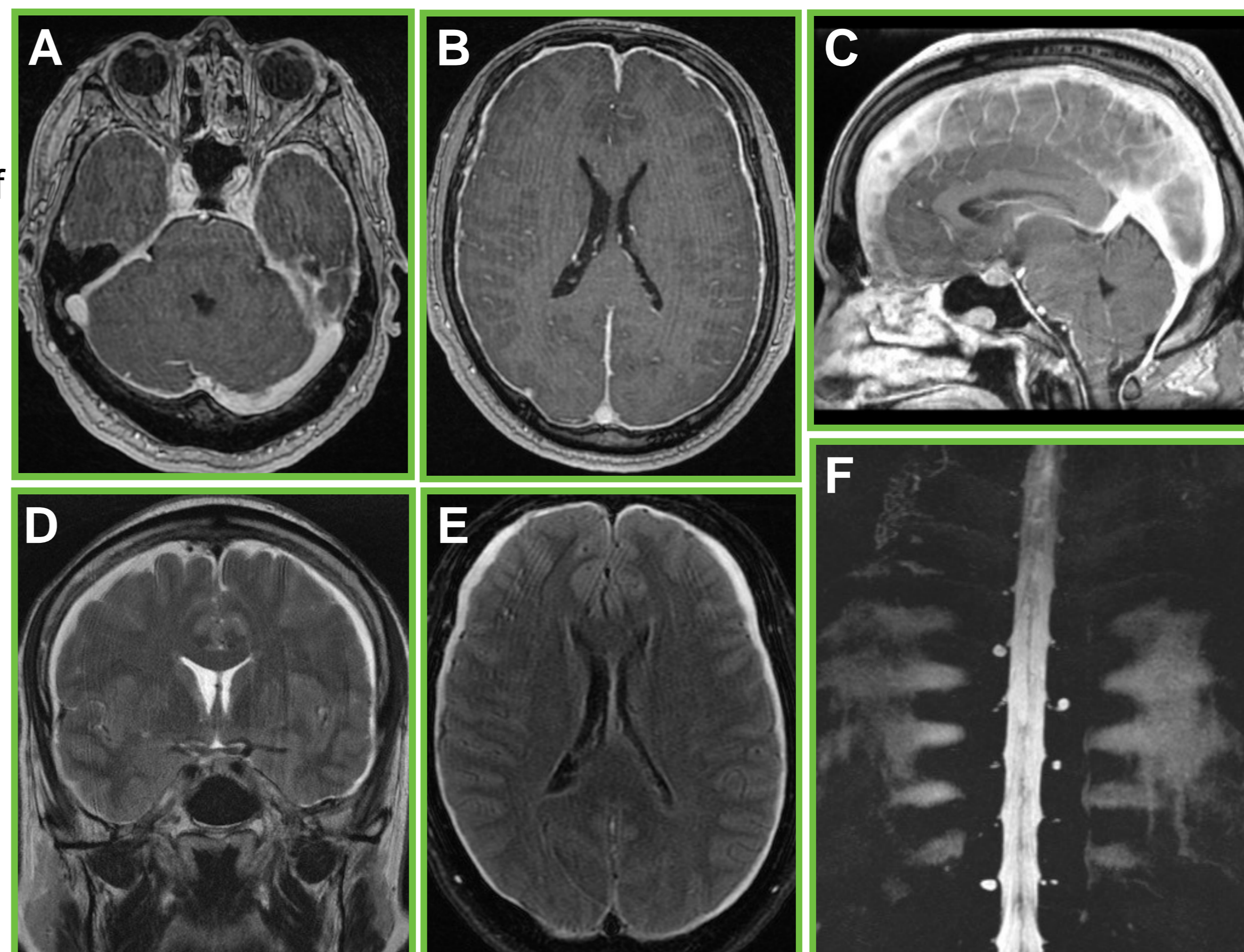
**Fig.1. Brain CT.**

Slight hyperdensities in the subarachnoid space of basal cisterns, reduced volume of basal cisterns (a,b); slight bilateral subdural hypodense fluid collections (c).



**Fig.2. Brain & Spine MRI.**

A, B, C T1 seq. plus gadolinium: reduced CSF spaces with obliteration of prepontine and perichiasmatic cisterns, reduced ventricular size, a greater evidence of dural venous sinuses, descent of brain structures and cerebellar tonsils, pachymeningeal enhancement after paramagnetic contrast injection. D, E T2 seq.: subdural fluid collections. F T2 myelo MRI seq.: enlargements of roots between T3 and T12.



## DISCUSSION

**Causes of pseudo-SAH:** [2,3,4,5,6,7,8,9,10]

- Diffuse cerebral edema anoxic-ischemic encephalopathy (sudden cardiac death/post-resuscitation encephalopathy, causes of cardiopulmonary failure, septic shock); metabolic-toxic encephalopathy (diabetic ketoacidosis, hyponatremia, narcotics, valproate).
- Chronic hypoxaemia.
- Cerebellar ischemic stroke, gliomatosis cerebri.
- Idiopathic changes in CSF pressure pseudotumour cerebri, SIH.
- Leptomeningitis pyogenic/aseptic/cryptococcal/leukemic meningitis.
- Venous sinus thrombosis, bilateral subdural hematoma.
- Contrast medium intrathecal administration, venous extravasation.
- Others dural or vessels calcification, bone partial volume averaging.

### Diagnostic criteria for SIH [11]

- Signs/symptoms of decreased intracranial pressure
- No focal neurological signs, except for cranial nerve
- Two of the following:
  - Brain MRI suggestive or normal (20% of cases).[1]
  - Sustained improvement after epidural blood patching.
  - CSF opening pressure in sitting position  $\leq 60$  mmH<sub>2</sub>O.
  - Demonstration of an active spinal CSF leak.
- No dural puncture in the 4 weeks preceding onset
- Not better accounted for by another disorder

### ICHD criteria for headache due to SIH [12]

- Any headache fulfilling criterion C
- CSF pressure  $< 60$  mmH<sub>2</sub>O &/or CSF leakage evidence
- H. time-related to CSF low pressure/leakage/discovery
- Not better accounted for by another ICHD-III diagnosis.

Thunderclap headache in 15% SIH patients. [1]

Venous vascular dilatation, according to Monro-Kellie doctrine, may be the substrate for PseudoSAH. [1,4]

**IN OUR CASE** pseudo-SAH was due to SIH and probably also to chronic hypoxaemia.

## CONCLUSIONS

- Pseudo-SAH is a rare brain CT finding and a potential pitfall in the emergency room.
- SIH may mimic SAH for both clinical symptoms and radiological features.
- Venous vascular dilatation may be the substrate for Pseudo-SAH in SIH.

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