PRES

Posterior Reversible Encephalopathy Syndrome · reversible only if you find the trigger and remove it early

Neither always
posterior nor reversible

RECOGNIZE IT *four symptoms, usually evolving over hours to days*

THE CLINICAL PICTURE

Headache, seizures, visual disturbance and altered mental status. Seizures are often the presenting event and may be the only one. Visual change ranges from blurring and hemianopia to **cortical blindness with intact pupillary reflexes**, which is a striking and easily misattributed finding.

THE BLOOD PRESSURE CLUE

Usually hypertensive, but **what matters is the RATE of rise, not the absolute number**. A previously normotensive patient, such as a young woman with eclampsia, can develop PRES at a pressure another patient tolerates daily. **Around 20% to 30% are normotensive**, particularly drug-induced cases.

THE MECHANISM, WHICH EXPLAINS EVERYTHING

Failure of cerebral autoregulation causes vasogenic edema. The posterior circulation is preferentially affected because it has **less sympathetic innervation** to defend against surges. Vasogenic, not cytotoxic, is why it is reversible and why the imaging differs from stroke.

IMAGING *and the one sequence that separates it from stroke*

Finding	Detail
MRI is the test	**T2 and FLAIR hyperintensity**, typically **bilateral, symmetric, parieto-occipital and subcortical**. CT is frequently normal early, so **a normal CT does not exclude PRES** and should not end the workup in a patient with a compatible picture
⚠ DWI and ADC decide it	**Vasogenic edema shows a HIGH ADC without true diffusion restriction**, whereas an acute infarct restricts. This is the single most useful discriminator from stroke, and it is what tells you the changes should reverse. **Areas that do restrict indicate infarction and predict incomplete recovery**
Atypical distributions are common	Frontal, temporal, cerebellar, brainstem and basal ganglia involvement all occur, and unilateral or asymmetric disease is well recognized. **The name is misleading: do not exclude PRES because the changes are not posterior**
Complications to look for	**Hemorrhage and infarction**, present in a meaningful minority and associated with worse outcome. Also consider the overlap with **RCVS**, since the two coexist and RCVS shows segmental vasoconstriction on angiography with thunderclap headache

FIND THE TRIGGER *the treatment is removing the cause, so the list is the therapy*

Trigger	Detail
Severe or rapidly rising hypertension	Hypertensive emergency of any cause, including renovascular disease, pheochromocytoma, and autonomic dysreflexia
⚠ Preeclampsia and eclampsia	**The commonest obstetric cause, and the most time-critical.** Treatment is **magnesium sulfate for seizure control, blood pressure control, and delivery**. PRES can also appear **postpartum**, so it remains on the differential in a woman weeks after delivery
Immunosuppressants and cytotoxics	**Calcineurin inhibitors, tacrolimus and cyclosporine, are the classic culprits**, and importantly **can cause it at therapeutic drug levels**, so a normal level is no reassurance. Also many chemotherapy agents, bevacizumab and other VEGF inhibitors. **Stopping or switching the drug is the treatment**
Renal failure and autoimmune disease	Acute or chronic kidney disease, especially with volume overload. **Lupus, scleroderma renal crisis, vasculitis and thrombotic microangiopathy** are all associated
Sepsis and other	Sepsis and shock, massive transfusion, tumor lysis, and electrolyte disturbance. **PRES is frequently multifactorial**, so finding one trigger does not mean you should stop looking

MANAGEMENT *three simultaneous jobs*

1. LOWER THE PRESSURE, CAREFULLY

Reduce mean arterial pressure by roughly 20% to 25% in the first hours, using a titratable IV agent such as nicardipine or labetalol. **Do not crash the pressure:** autoregulation is already impaired, and an abrupt drop causes watershed ischemia and converts reversible edema into infarction.

2. REMOVE THE CAUSE

Stop or switch the offending drug, deliver in eclampsia, treat the sepsis, correct the volume overload. Without this, blood pressure control alone often fails, which is the usual reason a case does not improve.

3. CONTROL SEIZURES

Magnesium in eclampsia, otherwise a standard antiseizure medication. **Long-term antiseizure therapy is usually unnecessary** once the trigger has resolved, since these are provoked seizures. Continuous EEG if the mental state does not match the imaging, to exclude **non-convulsive status**.

THE MIMICS *each is managed differently, and two are time-critical*

Mimic	What overlaps	What separates it
Ischemic stroke	Focal deficit, visual loss, imaging abnormality	**Diffusion restriction on MRI**, a vascular territory rather than a symmetric posterior pattern, and abrupt rather than evolving onset. **Getting this wrong matters both ways**: thrombolysis in PRES is harmful, and calling a stroke PRES loses the treatment window
RCVS *reversible cerebral vasoconstriction*	Headache, seizures, posterior imaging changes, and it can **coexist with PRES**	**Thunderclap headache is the signature**, recurring over days, with **segmental vasoconstriction on CTA, MRA or catheter angiography**. Triggered by vasoactive drugs, cannabis and the postpartum state. **Nimodipine is used, and steroids may worsen it**
Cerebral venous sinus thrombosis	Headache, seizures, edema, and it shares the postpartum and prothrombotic populations	**Needs dedicated venous imaging**, CT or MR venography, which is not part of a routine scan. **Treatment is anticoagulation**, so missing it is consequential
Status epilepticus and Todd paresis	Altered mental state, focal deficit, cortical imaging change	Seizure itself causes transient cortical changes. **EEG settles it**, and remember the two coexist: PRES causes seizures, so finding one does not exclude the other
Autoimmune or infectious encephalitis	Confusion, seizures, imaging change	Fever, CSF pleocytosis, and a **medial temporal rather than parieto-occipital** distribution. Lumbar puncture where the picture is not clean

PEARLS & PITFALLS

- **The name misleads on both counts.** It is **not always posterior**, and it is **not always reversible**: delayed recognition, established infarction or hemorrhage all leave permanent deficits. Treat it as time-critical rather than as a benign radiological label.
- **Most patients recover substantially within days to weeks**, and imaging lags clinical improvement, so **do not repeat the MRI early and conclude treatment has failed** when the patient is improving.
- **In a pregnant or recently pregnant woman with a seizure, assume eclampsia and give magnesium** while the workup proceeds, and keep RCVS, venous sinus thrombosis and hemorrhage on the list.

References: Published reviews and case series on posterior reversible encephalopathy syndrome · ACOG guidance on hypertensive disorders of pregnancy and eclampsia management · standard neuroimaging references on vasogenic versus cytotoxic edema.

Educational aid; verify against current guidance, local formulary and patient factors.

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