PVM06CHEATSHEET

Central Causes and Posterior Fossa Pathology

Recognising Life-Threatening Vertigo in Children

WHY THIS MATTERS

Central causes of vertigo carry high morbidity and mortality if missed. Posterior fossa tumours, cerebellar stroke, demyelination, and Chiari malformation can all present with dizziness in children. Peripheral diagnoses are diagnoses of exclusion only — every paediatric vestibular assessment must include a structured central screen. The clinical tools to distinguish peripheral from central are bedside and require no imaging to initiate.

RED FLAGS — ALWAYS REFER URGENTLY

Red flag	Clinical detail	Action
Constant headache + dizziness (esp. morning)	Tumour; elevated ICP; posterior fossa medulloblastoma	MRI brain urgently — same day
Normal HINTS head impulse in acute sustained vertigo	VOR intact = brainstem/cerebellum NOT peripheral labyrinth	MRI-DWI emergency — do not reassure
Vertical or direction-changing nystagmus	Central until proven otherwise	MRI same day
Ataxia disproportionate to dizziness	Cerebellar/brainstem pathology	MRI posterior fossa same day
Diplopia, dysphagia, facial weakness	Lateral medullary syndrome (Wallenberg); brainstem lesion	Stroke code — emergency MRI-DWI
Progressive SNHL + unilateral vertigo in adolescent	NF2; bilateral acoustic schwannoma	MRI IAC with contrast; genetics
Age <3 years with any dizziness	Limited history; central lesions mimic benign conditions	Low threshold for MRI; paediatric neurology

DIFFERENTIAL DIAGNOSIS — CENTRAL CAUSES BY AGE

Diagnosis	Key feature	Age peak
Posterior fossa tumour (medulloblastoma)	Morning vomiting + truncal ataxia + headache + no clear vertigo	3–8 yr (peak)
Posterior fossa tumour (ependymoma)	Slowly progressive; hydrocephalus; cranial nerve signs	3–5 yr
Cerebellar astrocytoma	Appendicular ataxia + headache; morning vomiting; no nystagmus initially	5–12 yr
Chiari I malformation	Occipital headache worsened by Valsalva; downbeat nystagmus; scoliosis	School age; delayed Dx
ADEM (post-infectious)	Multifocal; encephalopathy; 2–4 weeks post-URTI/vaccination	2–8 yr
Paediatric MS	Relapsing; INO; optic neuritis; fatigue; bladder symptoms	Adolescent; rare <10
Cerebellar stroke/infarct	Acute onset; HINTS normal-HIT; vascular risk factor	Any — sickle cell; cardiac
Basilar migraine (VM + brainstem aura)	Episodic; diplopia; dysarthria; fully resolves; family history	School age

INVESTIGATIONS — PROTOCOL

Test	Indication	Priority
MRI brain + posterior fossa + IAC ± contrast	All atypical dizziness; any red flag present	Urgent / same day if red flags
MRI-DWI (diffusion weighted)	Acute sustained vertigo with normal peripheral exam	Emergency — exclude stroke
Ophthalmology (fundoscopy)	Papilloedema; optic neuritis screening	Same session if ICP suspected
EEG	Vertiginous epilepsy; episodic with LOC	Outpatient; if seizure disorder queried
Audiology (PTA + ABR)	Unilateral progressive SNHL; NF2 screen; bilateral loss	Urgent if hearing loss present
Paediatric neurology referral	All confirmed / suspected central pathology	Concurrent with imaging

CHIARI MALFORMATION — CLINICAL RECOGNITION

Feature	Detail
Definition	Cerebellar tonsil herniation >5 mm below foramen magnum on MRI (Cincinnati criteria)
Key symptoms	Occipital headache worsened by Valsalva, cough, Trendelenburg; downbeat nystagmus; scoliosis 20–30%
Dizziness pattern	Chronic; worsened by exertion; disequilibrium more than rotatory vertigo
Hearing	Unilateral SNHL; pulsatile tinnitus; aural fullness from CSF pressure fluctuation
Management	Paediatric neurosurgery referral; surgical decompression if symptomatic progression
Pitfall	Often labelled anxiety or benign headache for years — always ask about Valsalva-triggered symptoms

POSTERIOR FOSSA TUMOURS — GP RECOGNITION

Tumour type	Age peak	Key vestibular/balance feature	Action
Medulloblastoma	3–8 yr	Truncal ataxia > vertigo; wide-based gait; morning vomiting	Emergency MRI
Ependymoma	3–5 yr	Slowly progressive; hydrocephalus; cranial nerve signs	Urgent MRI
Cerebellar astrocytoma	5–12 yr	Appendicular ataxia; headache; no nystagmus initially	Urgent MRI
Brainstem glioma	5–10 yr	Multiple cranial nerve palsies + ataxia; ominous prognosis	Emergency referral

DEMYELINATION — KEY DISTINCTIONS

- ADEM vs MS: ADEM is post-infectious, polyfocal, and typically monophasic (more common <10 years); MS is focal, relapsing, and older adolescent.
- INO (internuclear ophthalmoplegia) — failure of ipsilateral adduction on horizontal gaze — is pathognomonic for MLF lesion; always central.
- Paediatric MS patients have higher relapse rates than adults — early disease-modifying therapy is standard of care.
- All confirmed paediatric demyelination requires paediatric neurology referral for McDonald criteria assessment.
- Vestibular symptoms (nystagmus, oscillopsia, imbalance) are common presenting features of paediatric MS and ADEM.

PROGNOSIS BY DIAGNOSIS

Diagnosis	Outcome	Key action
Posterior fossa tumour (medulloblastoma)	5-year survival ~70–80% with surgery + craniospinal radiation + chemo	Immediate neurosurgery; oncology; multi-disciplinary
Chiari I — symptomatic	Surgical decompression highly effective; recurrence of symptoms uncommon	Paediatric neurosurgery; post-op VRT for balance symptoms
ADEM	Monophasic in 75%; full neurological recovery in majority	Paediatric neurology; MRI surveillance at 3 months
Paediatric MS	Relapsing; disease-modifying therapy reduces relapse rate by 50–70%	Paediatric neurology; early DMT initiation; monitoring MRI 6-monthly
Cerebellar stroke	Variable; recovery superior in children vs adults; early rehabilitation essential	Neurology; haematology; cardiac evaluation for source

WHEN TO REFER

- **► Any red flag symptom — emergency MRI + paediatric neurology same day without delay**
- **► Posterior fossa mass on MRI — paediatric neurosurgery consultation within 24 hours**
- **► Suspected Chiari malformation — paediatric neurosurgery; non-urgent if asymptomatic**
- **► Suspected paediatric MS or ADEM — paediatric neurology; CSF and oligoclonal band workup**
- **► Normal head impulse test in acute sustained vertigo — MRI-DWI emergency; stroke pathway regardless of age**

♦ The most dangerous assumption in paediatric dizziness: that a child is too young for a stroke. Cerebellar and brainstem infarcts occur in children with sickle cell, protein C/S deficiency, cardioembolism, and arterial dissection. A NORMAL head impulse test in acute sustained vertigo means the VOR is intact — central cause is MORE likely than peripheral. MRI-DWI is mandatory regardless of age.

♦ Posterior fossa tumours rarely announce themselves with dizziness — the classic triad is morning vomiting, progressive truncal ataxia, and headache. Any child labelled as "chronic dizziness and headaches" with an abnormal gait deserves MRI brain before the label of vestibular migraine is applied. The diagnosis of exclusion requires excluding the dangerous diagnoses first.