

THE DIAGNOSIS OF BRAIN TUMOURS IN CHILDREN: A GUIDELINE FOR HEALTHCARE PROFESSIONALS

HEADACHES

- Consider a brain tumour in any child with a new, persistent* headache
- Headache in isolation, unlikely to be a brain tumour
- Brain tumour headaches occur at any time of day
- Children aged younger than 4 years may not be able to describe a headache – observe behaviour

CNS IMAGING REQUIRED WITH:

- Persistent headache that wakes a child from sleep
- Persistent headache that occur on waking
- Persistent headache in a child under 4
- Confusion or disorientation with a headache
- Persistent headache with 1 or more other symptoms

COMMON PITFALLS:

- *Failure to reassess a child with a migraine or tension headache when the headache character changes*

*Persistent = continuous or recurrent headache present for more than 4 weeks

NAUSEA AND VOMITING

- Consider a brain tumour in any child with persistent* nausea and/or vomiting
- Head circumference should be measured and plotted in children under 2 with persistent* vomiting

CNS IMAGING REQUIRED:

- Persistent vomiting on awakening (NB: exclude pregnancy where appropriate)
- Persistent nausea/vomiting with 1 or more other symptom

COMMON PITFALLS:

- *Failing to consider a CNS cause for persistent nausea and vomiting*

*Persistent = nausea and/or vomiting present for more than 2 weeks

VISUAL SYMPTOMS AND SIGNS

- Consider a brain tumour in any child with persistent* visual abnormality
- Visual assessment requires assessment of:
 - visual acuity
 - eye movements
 - pupil responses
 - optic disc appearance
 - visual fields (>= 5 yrs)
- Pre-school and uncooperative children should be assessed by hospital eye service within 2 weeks of referral
- Parent concern alone warrants referral for visual assessment

CNS IMAGING REQUIRED WITH:

- Papilloedema
- Optic atrophy
- New onset nystagmus
- Reduction in visual acuity not due to refractive error
- Visual field reduction
- Proptosis
- New onset paralytic squint
- Visual symptom with 1 or more other symptom

COMMON PITFALLS:

- *Failure to fully assess vision – REFER IF NECESSARY*
- *Failure of communication between community optometry and primary and secondary care*

*Persistent = visual abnormality present for more than 2 weeks

REFERRAL FROM PRIMARY CARE:

High risk of tumour – SAME DAY referral to secondary care

Lower risk* - specialist assessment within 2 weeks

IMAGING:

High risk of tumour – URGENT CNS imaging

Lower risk* - CNS imaging within 4 weeks

*Lower risk = CNS tumour in differential diagnosis, low index of suspicion

CONSIDER A BRAIN TUMOUR IN ANY CHILD PRESENTING WITH:

Headache

Nausea and/or vomiting

Visual symptoms and signs

reduced visual acuity and/or fields

abnormal eye movements

abnormal fundoscopy

Motor symptoms and signs

abnormal gait

abnormal coordination

focal motor weakness

Growth and endocrine symptoms

growth failure (weight/height)

delayed, arrested or precocious puberty

galactorrhoea

primary/secondary amenorrhoea

Increasing head circumference

Behavioural change

Diabetes insipidus

Seizures (see www.nice.org.uk/guidance/qs27)

Altered consciousness (see <http://www.nottingham.ac.uk/paediatric-guideline/Guideline%20algorithm.pdf>)

ASK ABOUT COMMON PREDISPOSING FACTORS:

- Personal or FH of brain tumour, sarcoma, leukaemia or early onset breast cancer
- Neurofibromatosis
- Tuberous sclerosis
- Other familial genetic syndromes

ASSESS THESE CHILDREN WITH:

History: associated symptoms
any predisposing factors

Examination of:

Visual system
Motor system
Height and weight
Head circumference (<2yrs)
Pubertal status

IF TWO OR MORE SYMPTOMS - SCAN

ASSESSMENT PITFALLS:

- Initial symptoms of brain tumour can mimic other common illnesses
- Symptoms frequently fluctuate – resolution then recurrence does not exclude a brain tumour
- A normal neurological examination does not exclude a brain tumour
- Language difficulties – use interpreter

HEAD CIRCUMFERENCE

- Consider a brain tumour in any child with an increasing head circumference outside the normal range in comparison to their height and weight
- Careful assessment of other signs and symptoms of a brain tumour should be undertaken in these babies

CNS IMAGING REQUIRED:

- Rapid rate of head circumference growth crossing centiles
- Increasing head circumference with any other associated symptoms

COMMON PITFALLS:

- *Failing to measure and monitor head circumference in a baby or young child with persistent vomiting*

MOTOR SYMPTOMS AND SIGNS

- Consider a brain tumour in any child with persisting* motor abnormality
- Motor assessment requires history or observation of:
 - sitting and crawling in infants
 - walking and running
 - handling of small objects
 - handwriting in school age children
- Brain tumours can cause a loss or change in motor skills and this can be subtle e.g. ability to play computer games

CNS IMAGING REQUIRED WITH:

- Regression in motor skills
- Focal motor weakness
- Abnormal gait/ co-ordination (unless local cause)
- Bells palsy with NO improvement within 4 weeks
- Swallowing difficulties (unless local cause)
- Head tilt/ torticollis (unless local cause)
- Motor symptom with 1 or more other symptom

COMMON PITFALLS:

- *Attributing abnormal gait/balance to middle ear disease with no corroborating findings*
- *Failure to identify swallowing difficulties and aspiration as a cause of recurrent chest infections*

*Persistent = motor abnormality present for more than 2 weeks

GROWTH AND ENDOCRINE

- Consider a brain tumour in any child with any combination of growth failure, delayed/arrested puberty and polyuria/polydipsia
- Early specialist assessment if required for:
 - Precocious puberty/delayed or arrested puberty
 - Growth failure
 - Galactorrhoea
 - Primary or secondary amenorrhoea

CNS IMAGING REQUIRED WITH:

- Growth or endocrine symptom with 1 or more other symptoms

COMMON PITFALLS:

- *Failing to consider a CNS cause in children with weight loss and vomiting*
- *Failure to consider diabetes insipidus in children with polyuria and polydipsia*

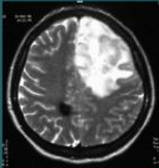
BEHAVIOUR

- Consider a brain tumour in any child with new onset lethargy, mood disturbance, withdrawal or disinhibition

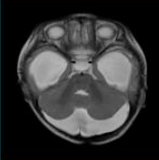
COMMON PITFALLS:

- *Failing to consider a physical cause for behavioural symptoms*

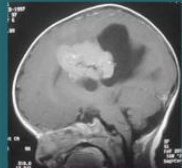
PRESENTING SYMPTOMS OF BRAIN TUMOURS BY SUB-SPECIALTY




Supratentorial tumours can cause change in personality, mood or disinhibition. They can also cause symptoms of anorexia. A brain tumour needs to be considered as part of the differential diagnosis.



A young child with hydrocephalus caused by a brain tumour will have an increasing head circumference and developmental delay or regression.




A supratentorial cortical tumour will present with focal neurological signs such as weakness.




Psychiatry

- Anorexia
- Behavioural change
- Depression
- Psychosis



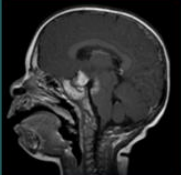
Community

- Developmental delay
- Developmental regression
- Increasing head circumference




Neurology

- Seizures
- Motor weakness
- CN palsies
- Ataxia/cerebellar
- Focal neurological deficits




Central tumours such as an optic pathway glioma are slow growing and will present with progressive visual symptoms that may present to an ophthalmologist.



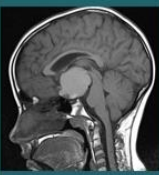
Ophthalmology

- Papilloedema
- Decreased visual acuity
- Nystagmus/Parinauds
- Diplopia
- Squint
- Visual field defect
- Blindness
- Ptosis
- Proptosis
- Ocular palsies
- Ophthalmoplegia




Endocrinology

- Growth problem
- Hypo-pit/pituitary dysfunction
- Diabetes insipidus
- Precocious or delayed puberty
- Menstrual irregularities
- Galactorrhoea
- Gynaecomastia
- Cushing's
- Obesity/ weight gain




Central tumours such as a craniopharyngioma are slow growing and will present with abnormal growth or precocious or delayed puberty. These children may also have visual symptoms.




Ear, nose & throat

- Dizziness
- Vertigo
- Torticollis
- Head tilt
- Hearing loss
- Tinnitus



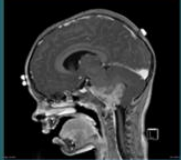
Gastroenterology

- Nausea & vomiting
- Abdominal pain
- Reflux
- Failure to thrive
- Dysphagia

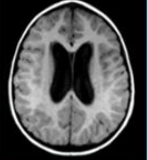


Respiratory

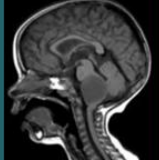
- Recurrent chest infections
- Apnoeas



Head tilt or torticollis can be caused by a posterior fossa tumour. These symptoms may present to ENT specialists as head tilt and torticollis have other common ENT causes.



A child with hydrocephalus caused by a brain tumour will have persistent vomiting. In infants where the sutures are not yet fused there will be no other signs of hydrocephalus aside from macrocephaly.



Recurrent respiratory infections can occur secondary to aspiration caused by a bulbar palsy. This MRI shows a brainstem tumour which causes cranial nerve palsies.

Figure 10. Brain tumour presentation by specialty