

Case 3: Head Trauma

2 yo M brought into the ED by his mother after sustaining a head injury 2 hours prior to arrival.

Patient was jumping on the bed with his 4 year old sister at 6pm when he had a witnessed fall off the bed, landing forehead first onto a hardwood floor. After the fall he was unconscious for “about 30 seconds” per mom, and had some shaking of his arms and legs that “looked like convulsions.” Afterwards he woke up and has been acting normally since per parents. He ate dinner, but then mom noticed that he has a large “bump” on his forehead that seems to be painful, so she brought him to the ED for evaluation.

Triage vital signs in the ED at 8pm include temperature 36.9 (98.4F), blood pressure 104/64, heart rate 110bpm, and respiration rate 22/min. His Glasgow Coma Scale is 15 (assessed upon arrival walking into the ED). On physical examination in his mother’s arms, the child is sleeping but rousable with moderate stimulation. When examined, the child looks at the examiner, cries and says “no”, pushes the penlight away with both hands, and turns his face into his mother’s chest. Pupils are symmetrically 4mm (2mm when penlight is shone into them). He has a 2cm raised, purpuric area just above his right eyebrow, which is tender to palpation, but no ecchymoses, depression or stepoff are noted elsewhere on the scalp. He has a supple neck without tenderness, and no tenderness is elicited when palpating his abdomen, long bones, joints, or other bony prominences. He is given oral acetaminophen for pain.

Patient is otherwise well, without underlying medical conditions and takes no medications.

Case discussion prompts:

Does this patient need head imaging? What tools can help guide your decision in this case?

Does this patient warrant observation in the hospital?

How might head imaging or hospitalization be of low-value (high cost and risk and no impact on outcome) to this patient?

Toolkit teaching points for discussion:

Harms to head imaging with CT:

1. Radiation with increased risk of malignancy
 - a. risk of malignancy from head CT 1.9 per 10,000 children

(Miglioretti, et al. The use of computed tomography in pediatrics and the associated radiation exposure and estimated cancer risk JAMA Pediatr. 2013 Aug 1;167)

2. Cost (Charges)-- possible: ED visit, pediatrics consult, Head CT, Neurosurgery consult, hospital overnight admission for observation
 - a. Chargemaster at home program when available
 - b. <http://www.healthcarebluebook.com>
3. Potential need for sedation
 - a. Risk of sedation at young age on developmental outcomes
4. Finding of small bleed or linear skull fracture that leads to further workup
 - a. some NSG do keppra ppx for small bleed
 - b. some NSG do f/u head CT to trend findings, which increases harms #1-3
5. Overdiagnosis: Findings (eg incidental cyst in asymptomatic patient) that leads to further work up or stress.
 - a. ~4% prevalence of incidental findings on head CT in children with head trauma. (Rogers, et al. Incidental findings in children with blunt head trauma evaluated with cranial CT scans. Pediatrics. 2013 Aug;132(2)).
6. False reassurance to family if negative head CT
 - a.

Toolkit references:

1. PECARN clinic decision making tool to identify patients at low risk for clinically significant traumatic brain injury (Kupperman, et al. Identification of children at very low risk of clinically-important brain injuries after head trauma: a prospective cohort study. The Lancet (2009), v374. <http://www.pecarn.org/>)

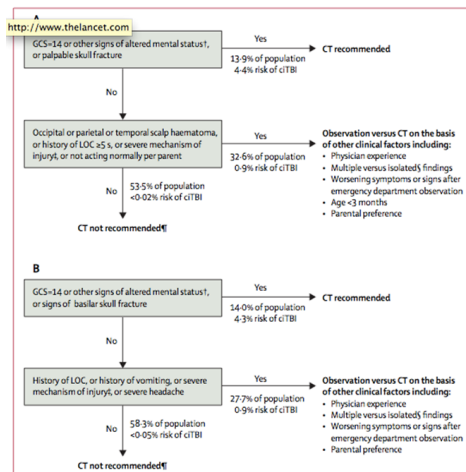


Figure 3: Suggested CT algorithm for children younger than 2 years (A) and for those aged 2 years and older (B) with GCS scores of 14-15 after head trauma*