

CT for pediatric epidural hematoma

Many physicians endorse ICU admission and repeat neuroimaging for pediatric mTBI with ICI, despite uncertainty regarding the clinical utility of those decisions. These results, combined with evidence that existing practice may provide insufficient monitoring to some high-risk children, emphasize the need for validated decision tools to aid the management of these patients ¹⁾.

Follow-up CT scans changed clinical approach in only one patient in the present series. When ordering CT scan in the follow-up of pediatric traumas, benefits and harms should be weighted based upon time interval from trauma onset to initial CT scan and underlying pathology ²⁾.

Reimaging is common, but rarely changes management. Limiting reimaging to patients with concerning neurologic findings or mass effect on initial evaluation could reduce imaging by >50% ³⁾.

A study of Hale et al., showed that machine-learning can be leveraged to more accurately predict TBI outcomes in children ⁴⁾.

A work of Samples et al., from the [University of Texas Health Science Center at San Antonio](#) aimed to further elucidate the need for serial imaging to surgical decision-making.

A prospectively maintained single-institution trauma [database](#) was reviewed at a level-1 trauma center to identify patients 18 years old and younger presenting with PEDH over a 10-year period. Selected charts were reviewed for demographic information, mechanisms of injury, neurologic exam, radiographic findings, and treatment course. Surgical decisions were at the discretion of the neurosurgeon on call, often in discussion with a pediatric neurosurgeon.

Two hundred and ten records with traumatic epidural hematomas were reviewed. Seventy-three (35%) were taken emergently for hematoma evacuation. Of these, 18 (25%) underwent repeat imaging prior to surgery. One hundred and thirty-seven (65%) were admitted for observation. Seventy-two patients (53%) did not undergo repeat imaging. Sixty-five (47%) admitted for conservative management had at least one repeat scan during their hospitalization. Indications for follow-up imaging during conservative management included routine follow-up (74%), initial scan in our system following transfer (17%), neurological decline (8%), and unknown (1%). Thirteen patients (9%) were taken for surgery in a delayed fashion following admission. Twelve patients who went to surgery in a delayed fashion demonstrated progression on follow-up imaging; however, increase in hematoma size on repeat imaging was the sole surgical indication in only four patients (3%). There were no deaths related to the epidural hemorrhage or postoperatively, regardless of management, and all patients recovered to their pre-trauma baseline.

Given that isolated hematoma expansion accounted for an exceptionally small proportion of operative indications, this data suggests changes seen on CT should not be solely relied upon to dictate surgical management. The benefit of obtaining follow-up imaging must be strongly considered and weighed against the known deleterious effects of excessive radiation in pediatric patients, let alone its clinical utility ⁵⁾.

A study investigated the utility of head CT scanning in the pediatric patient presenting with normal neurologic examination. All patients undergoing head CT scanning for trauma in the emergency department (ED) at a tertiary care pediatric trauma center during 1992 were identified (508). Charts were reviewed for historical and physical examination findings, CT results, and need for neurosurgical intervention. Patients were excluded if they had an abnormal neurologic examination (179), known depressed skull fracture (11), bleeding diathesis (3), age older than 18 years (1), or developmental delay (1). Included were 313 patients (median 5.5 years) who presented with clinical variables including sleepiness (38%), vomiting (34%), headache (30%), loss of consciousness (LOC) (25%), irritability (22%), amnesia (20%), and seizures (8%). An abnormal head CT was noted in 88 cases (28%); 79 (25%) were traumatic abnormalities involving the skull and/or contents. Thirteen patients (4%) had intracranial injuries (ICI); all had either a linear (10), basilar (2), or depressed (1) skull fracture noted on CT. Four patients required neurosurgery, three for epidural hematoma, and one for a complicated orbital fracture (without ICI). No clinical variables (seizure, LOC, vomiting, headache, confusion, irritability, sleepiness, amnesia) were associated with ICI ($P > 0.05$). In pediatric head trauma patients, with normal neurologic examinations in the ED, ICI occurs $< 5\%$ of the time and neurosurgery is needed in 1% of the cases. Commonly used clinical variables are not associated with ICI in these children ⁶.

Unclassified

8: Sellin JN, Moreno A, Ryan SL, Lam SK, Donaruma-Kwoh M, Luerssen TG, Jea A. Children presenting in delayed fashion after minor head trauma with scalp swelling: do they require further workup? *Childs Nerv Syst.* 2017 Apr;33(4):647-652. doi: 10.1007/s00381-016-3332-7. Epub 2017 Jan 3. PubMed PMID: 28050641.

9: Flaherty BF, Moore HE, Riva-Cambrin J, Bratton SL. Pediatric patients with traumatic epidural hematoma at low risk for deterioration and need for surgical treatment. *J Pediatr Surg.* 2017 Feb;52(2):334-339. doi: 10.1016/j.jpedsurg.2016.09.005. Epub 2016 Sep 15. PubMed PMID: 27663125.

10: Young JY, Duhaime AC, Caruso PA, Rincon SP. Comparison of non-sedated brain MRI and CT for the detection of acute traumatic injury in children 6 years of age or less. *Emerg Radiol.* 2016 Aug;23(4):325-31. doi: 10.1007/s10140-016-1392-3. Epub 2016 May 11. PubMed PMID: 27166965.

11: Prasad GL, Gupta DK, Sharma BS, Mahapatra AK. Traumatic Pediatric Posterior Fossa Extradural Hematomas: A Tertiary-Care Trauma Center Experience from India. *Pediatr Neurosurg.* 2015;50(5):250-6. doi: 10.1159/000438488. Epub 2015 Aug 20. PubMed PMID: 26287640.

12: Josephsen JB, Kemp J, Elbabaa SK, Al-Hosni M. Life-threatening neonatal epidural hematoma caused by precipitous vaginal delivery. *Am J Case Rep.* 2015 Jan 30;16:50-2. doi: 10.12659/AJCR.892506. PubMed PMID: 25633886; PubMed Central PMCID: PMC4315626.

13: Skadorwa T, Zygańska E, Eibl M, Cizek B. Distinct strategies in the treatment of epidural hematoma in children: clinical considerations. *Pediatr Neurosurg.* 2013;49(3):166-71. doi: 10.1159/000359954. Epub 2014 Apr 8. PubMed PMID: 24732678.

14: Jung SW, Kim DW. Our experience with surgically treated epidural hematomas in children. *J Korean Neurosurg Soc.* 2012 Apr;51(4):215-8. doi: 10.3340/jkns.2012.51.4.215. Epub 2012 Apr 30.

PubMed PMID: 22737301; PubMed Central PMCID: PMC3377878.

15: Jung JM, Lee JY, Phi JH, Kim SK, Cheon JE, Kim IO, Wang KC. Value of routine immediate postoperative brain computerized tomography in pediatric neurosurgical patients. *Childs Nerv Syst.* 2012 May;28(5):673-9. doi: 10.1007/s00381-012-1716-x. Epub 2012 Feb 28. PubMed PMID: 22370691.

16: Sencer A, Aras Y, Akcakaya MO, Goker B, Kiris T, Canbolat AT. Posterior fossa epidural hematomas in children: clinical experience with 40 cases. *J Neurosurg Pediatr.* 2012 Feb;9(2):139-43. doi: 10.3171/2011.11.PEDS11177. PubMed PMID: 22295917.

17: Nayil K, Ramzan A, Arif S, Wani A, Sheikh Z, Wani T, Laharwal M, Dhar A. Hypodensity of extradural hematomas in children: an ominous sign. *J Neurosurg Pediatr.* 2011 Oct;8(4):417-21. doi: 10.3171/2011.7.PEDS11123. PubMed PMID: 21961552.

18: Sridhar K, Venkateswara PG, Ramakrishnaiah S, Iyer V. Posttraumatic retroclival acute subdural hematoma: report of two cases and review of literature. *Neurol India.* 2010 Nov-Dec;58(6):945-8. doi: 10.4103/0028-3886.73756. Review. PubMed PMID: 21150065.

19: Ciurea AV, Tascu A, Brehar FM, Nuteanu L, Rizea R. A life threatening problem in infants: supratentorial epidural hematoma. *J Med Life.* 2009 Apr-Jun;2(2):191-5. PubMed PMID: 20108539; PubMed Central PMCID: PMC3018979.

20: Jamous MA, Abdel Aziz H, Al Kaisy F, Eloqayli H, Azab M, Al-Jarrah M. Conservative management of acute epidural hematoma in a pediatric age group. *Pediatr Neurosurg.* 2009;45(3):181-4. doi: 10.1159/000218200. Epub 2009 May 14. PubMed PMID: 19440005.

21: Durham SR, Liu KC, Selden NR. Utility of serial computed tomography imaging in pediatric patients with head trauma. *J Neurosurg.* 2006 Nov;105(5 Suppl):365-9. PubMed PMID: 17328259.

22: Agrawal D, Cochrane DD. Traumatic retroclival epidural hematoma - a pediatric entity? *Childs Nerv Syst.* 2006 Jul;22(7):670-3. Epub 2006 Mar 21. PubMed PMID: 16550441.

23: Holsti M, Kadish HA, Sill BL, Firth SD, Nelson DS. Pediatric closed head injuries treated in an observation unit. *Pediatr Emerg Care.* 2005 Oct;21(10):639-44. PubMed PMID: 16215464.

24: Mander M, Larysz D, Pajak J, Klimczak A. Epidural hematomas in a child with Hutchinson-Gilford progeria syndrome. *Childs Nerv Syst.* 2003 Jan;19(1):63-5. Epub 2002 Nov 19. PubMed PMID: 12541091.

1)

Greenberg JK, Jeffe DB, Carpenter CR, Yan Y, Pineda JA, Lumba-Brown A, Keller MS, Berger D, Bollo RJ, Ravindra VM, Naftel RP, Dewan MC, Shah MN, Burns EC, O'Neill BR, Hankinson TC, Whitehead WE, Adelson PD, Tamber MS, McDonald PJ, Ahn ES, Titsworth W, West AN, Brownson RC, Limbrick DD. North American survey on the post-neuroimaging management of children with mild head injuries. *J Neurosurg Pediatr.* 2018 Oct 26;23(2):227-235. doi: 10.3171/2018.7.PEDS18263. PubMed PMID: 30485194.

2)

Öğrenci A, Koban O, Ekşi M, Yaman O, Dalbayrak S. The Necessity of Follow-Up Brain Computed-Tomography Scans: Is It the Pathology Itself Or Our Fear that We Should Overcome? *Open Access Maced J Med Sci.* 2017 Oct 5;5(6):740-743. doi: 10.3889/oamjms.2017.157. eCollection 2017 Oct 15. PubMed PMID: 29104682; PubMed Central PMCID: PMC5661711.

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Flaherty BF, Moore HE, Riva-Cambrin J, Bratton SL. Repeat Head CT for Expectant Management of Traumatic Epidural Hematoma. *Pediatrics*. 2018 Sep;142(3). pii: e20180385. doi: 10.1542/peds.2018-0385. PubMed PMID: 30154118.

4)

Hale AT, Stonko DP, Brown A, Lim J, Voce DJ, Gannon SR, Le TM, Shannon CN. Machine-learning analysis outperforms conventional statistical models and CT classification systems in predicting 6-month outcomes in pediatric patients sustaining traumatic brain injury. *Neurosurg Focus*. 2018 Nov 1;45(5):E2. doi: 10.3171/2018.8.FOCUS17773. PubMed PMID: 30453455.

5)

Samples DC, Bounajem MT, Wallace DJ, Liao L, Tarasiewicz I. Role of follow-up CT scans in the management of traumatic pediatric epidural hematomas. *Childs Nerv Syst*. 2019 Jun 8. doi: 10.1007/s00381-019-04236-7. [Epub ahead of print] PubMed PMID: 31177323.

6)

Schunk JE, Rodgerson JD, Woodward GA. The utility of head computed tomographic scanning in pediatric patients with normal neurologic examination in the emergency department. *Pediatr Emerg Care*. 1996 Jun;12(3):160-5. PubMed PMID: 8806136.

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