

Cervical Spine Injury in Infants and Children

Julie C. Leonard

REFERENCES

- Ahmad FA, Schwartz H, Browne LR, et al: Methods for collecting paired observations from emergency medical services and emergency department providers for pediatric cervical spine injury risk factors. *Acad Emerg Med* 24: 432, 2017. [PMID: 27976464]
- Viccellio P, Simon H, Pressman BD, et al: A prospective multicenter study of cervical spine injury in children. *Pediatrics* 108: E20, 2001. [PMID: 11483830]
- Leonard JR, Jaffe DM, Kuppermann N, et al: Cervical spine injury patterns in children. *Pediatrics* 133: e1179, 2014. [PMID: 24777222]
- Goldberg W, Mueller C, Panacek E, et al: Distribution and patterns of blunt traumatic cervical spine injury. *Ann Emerg Med* 38: 17, 2001. [PMID: 11423806]
- Young AJ, Wolfe L, Tinkoff G, Duane TM: Assessing incidence and risk factors of cervical spine injury in blunt trauma patients using the National Trauma Data Bank. *Am Surg* 81: 879, 2015. [PMID: 26350665]
- Brown RL, Brunn MA, Garcia VF: Cervical spine injuries in children: a review of 103 patients treated consecutively at a level 1 pediatric trauma center. *J Pediatr Surg* 36: 1107, 2001. [PMID: 11479837]
- Mohseni S, Talving P, Branco BC, et al: Effect of age on cervical spine injury in pediatric population: a National Trauma Data Bank Review. *J Pediatr Surg* 46: 1771, 2011. [PMID: 21929988]
- Easter JS, Barkin R, Rosen C, Ban K: Cervical spine injuries in children, part I: mechanism of injury, clinical presentation, and imaging. *J Emerg Med* 41: 142, 2011. [PMID: 20493655]
- Pang D: Spinal cord injury without radiographic abnormality in children, 2 decades later. *Neurosurgery* 55: 1325, 2004. [PMID: 15574214]
- Polk-Williams A, Carr BG, Blinman TA, et al: Cervical spine injury in young children: a National Trauma Data Bank review. *J Pediatr Surg* 43: 1718, 2008. [PMID: 18779013]
- Martin BW, Dykes E, Lecky FE: Patterns and risks in spinal trauma. *Arch Dis Child* 80: 860, 2004. [PMID: 15321867]
- Katz JS, Oluigbo CO, Wilkinson CC, et al: Prevalence of cervical spine injury in infants with head trauma. *J Neurosurg Pediatr* 5: 470, 2010. [PMID: 20433260]
- National Association of EMS Physicians and American College of Surgeons Committee on Trauma: EMS spinal precautions and the use of the long backboard. *Prehosp Emerg Care* 17: 392, 2013. [PMID: 23458580]
- Nypaver M, Treloar D: Neutral cervical spine positioning in children. *Ann Emerg Med* 23: 208, 1994. [PMID: 8304600]
- Curran C, Dietrich AM, Bowman MJ, Ginn-Pease ME, King DR, Kosnik E: Pediatric cervical-spine immobilization: achieving neutral position? *J Trauma* 39: 729, 1995. [PMID: 7473965]
- Lerner EB, Billittier AJ, Moscati R: Effects of neutral positioning with and without padding on spinal immobilization. *Prehosp Emerg Care* 2: 112, 1998. [PMID: 9709329]
- Sheerin F, de Frein R: The occipital and sacral pressures experienced by healthy volunteers under spinal immobilization: a trial of three surfaces. *J Emerg Nurs* 33: 447, 2007. [PMID: 17884474]
- Ben-Galim P, Dreiangel N, Mattox KL, Reitman CA, Kalantar SB, Hipp JA: Extrication collars can result in abnormal separation between vertebrae in the presence of a dissociative injury. *J Trauma* 69: 447, 2010. [PMID: 20093981]
- Kwan I, Bunn F, Roberts IG: Spinal immobilization for trauma patients. *Cochrane Database Syst Rev* 2: CD002803, 2001. [PMID: 11406043]
- Davues G, Deakin C, Wilson A: The effect of a rigid collar on intracranial pressure. *Injury* 27: 647, 1996. [PMID: 9039362]
- Schafermeyer RW, Ribbeck BM, Gaskins J, Thomason S, Harlan M, Attkisson A: Respiratory effects of spinal immobilization in children. *Ann Emerg Med* 20: 1017, 1991. [PMID: 1877767]
- Cross DA, Baskerville J: Comparison of perceived pain with different immobilization techniques. *Prehosp Emerg Care* 5: 270, 2001. [PMID: 11446541]
- Leonard JC, Mao J, Jaffe DM: Potential adverse effects of spinal immobilization in children. *Prehosp Emerg Care* 16: 513, 2012. [PMID: 22712615]
- March JA, Ausband SC, Brown LH: Changes in physical examination caused by use of spinal immobilization. *Prehosp Emerg Care* 6: 421, 2002. [PMID: 12385610]
- Mannix R, Nigrovic LE, Schutzman SA, et al: Factors associated with the use of cervical spine computed tomography imaging in pediatric trauma patients. *Acad Emerg Med* 18: 905, 2011. [PMID: 21854487]
- National Association of EMS Physicians and the American College of Surgeons Committee on Trauma: EMS spinal precautions and the use of the rigid long backboard. *Prehosp Emerg Care* 17: 392, 2013. [PMID: 23458580]
- Fischer PE, Perina DG, Delbridge TR, et al: Spinal motion restriction in the trauma patient: a joint position statement. *Prehosp Emerg Care* 22: 659, 2018. [PMID: 30091939]
- Powell EC, Leonard JR, Olsen CS, et al: Atlantoaxial rotatory subluxation in children. *Pediatr Emerg Care* 33: 86, 2017. [PMID: 28141768]
- Stiell IG, Clement CM, McKnight RD, et al: The Canadian C-spine rule versus the NEXUS low-risk criteria in patients with trauma. *N Engl J Med* 349: 2510, 2003. [PMID: 14695411]
- Stiell IG, Clement CM, Grimshaw J, et al: Implementation of the Canadian C-spine rule: prospective 12 centre cluster randomised trial. *BMJ* 339: b4146, 2009. [PMID: 19875425]
- Stiell IG, Wells GA, Vandemheen KL, et al: The Canadian C-spine rule for radiography in alert and stable trauma patients. *JAMA* 286: 1841, 2001. [PMID: 11597285]
- Hoffman JR, Mower WR, Wolfson AB, et al: Validity of a set of clinical criteria to rule out injury to the cervical spine in patients with blunt trauma. National Emergency X-Radiography Utilization Study Group. *N Engl J Med* 343: 94, 2000. [PMID: 1443841]
- Hoffman JR, Schriger DL, Mower W, et al: Low-risk criteria for cervical-spine radiography in blunt trauma: a prospective study. *Ann Emerg Med* 21: 1454, 1992. [PMID: 1443841]
- Viccellio P, Simon H, Pressman BD, et al: A prospective multicenter study of cervical spine injury in children. *Pediatrics* 108: e20, 2001. [PMID: 11483830]
- Leonard JC, Kuppermann N, Olsen C, et al: Factors associated with cervical spine injury in children after blunt trauma. *Ann Emerg Med* 58: 145, 2011. [PMID: 21035905]
- Chung S, Mikrogianakis A, Wales PW, et al: Trauma Association of Canada Pediatric Subcommittee National Pediatric Cervical Spine Evaluation Pathway: consensus guidelines. *J Trauma* 70: 873, 2011. [PMID: 21610393]
- Nigrovic LE, Rogers AJ, Adelgais KM, et al: Utility of plain radiographs in detecting traumatic injuries of the cervical spine in children. *Pediatr Emerg Care* 28: 426, 2012. [PMID: 22531194]
- Garton HJ, Hammer MR: Detection of pediatric cervical spine injury. *Neurosurgery* 62: 700, 2008. [PMID: 18301348]
- Dietrich AM, Ginn-Pease ME, Bartkowski HM, King DR: Pediatric cervical spine fractures: predominantly subtle presentation. *J Pediatr Surg* 26: 995, 1991. [PMID: 1919996]
- Jaffe DM, Binns H, Radkowski MA, Barthel MJ, Engelhard HH 3rd: Developing a clinical algorithm for early management of cervical spine injury in pediatric trauma victims. *Ann Emerg Med* 16: 270, 1987. [PMID: 3813160]
- Blahd WH Jr, Iserson KV, Bjelland JC: Efficacy of posttraumatic cross table lateral view of the cervical spine. *J Emerg Med* 2: 243, 1985. [PMID: 4086761]
- Shaffer MA, Doris PE: Limitation of cross table lateral view in detecting cervical spine injuries: a retrospective analysis. *Ann Emerg Med* 10: 508, 1981. [PMID: 7283214]
- Jacobs LM, Schwartz R: Prospective analysis of acute cervical spine injury: a methodology to predict injury. *Ann Emerg Med* 15: 44, 1986. [PMID: 3942356]
- Buhs C, Cullen M, Klein M, Farmer D: The pediatric C-spine: is the "odontoid" view necessary? *J Pediatr Surg* 35: 994, 2000. [PMID: 10873052]
- Cattell HS, Filtzer DL: Pseudosubluxation and other normal variants in the cervical spine in children. *J Bone Joint Surg Am* 47: 1295, 1965. [PMID: 5837630]
- Jimenez RR, Deguzman MA, Shiran S, Karrellas A, Lorenzo RL: CT versus plain radiographs for evaluation of c-spine injury in young children: do benefits outweigh risks? *Pediatr Radiol* 38: 635, 2010. [PMID: 18368400]
- Adelgais KM, Grossman DC, Langer SG, Mann FA: Use of helical computed tomography for imaging the pediatric cervical spine. *Acad Emerg Med* 11: 228, 2004. [PMID: 15001401]
- Keiper MD, Zimmerman RA, Bilaniuk LT: MRI in the assessment of the supportive soft tissues of the cervical spine in acute trauma in children. *Neuroradiology* 40: 359, 1998. [PMID: 9689622]
- Mahajan P, Jaffe DM, Olsen CS, et al: Spinal cord injury without radiologic abnormality in children imaged with magnetic resonance imaging. *J Trauma Acute Care Surg* 75: 843, 2013. [PMID: 24158204]
- Jauregui JJ, Perfetti DC, Cautela FS, et al: Spine injuries in child abuse. *J Pediatr Orthop* 2016 [Epub ahead of print]. [PMID: 27662382]
- Choudhary AK, Bradford RK, Dias MS, et al: Spinal subdural hemorrhage in abusive head trauma: a retrospective study. *Radiology* 262: 216, 2012. [PMID: 22069156]
- Governale LS, Brink FW, Pluto CP, et al: A retrospective study of cervical spine MRI findings in children with abusive head trauma. *Pediatr Neurosurg* 53: 36, 2018. [PMID: 29084406]
- Jacob R, Cox M, Koral K, et al: MR imaging of the cervical spine in nonaccidental trauma: a tertiary institution experience. *AJNR Am J Neuroradiol* 37: 1944, 2016. [PMID: 27231224]
- Kadom N, Khademan Z, Vezina G, et al: Usefulness of MRI detection of cervical spine and brain injuries in the evaluation of abusive head trauma. *Pediatr Radiol* 44: 839, 2014. [PMID: 24557483]
- Kemp A, Cowley L, Maguire S: Spinal injuries in abusive head trauma: patterns and recommendations. *Pediatr Radiol* 44(suppl 4): S604, 2014. [PMID: 25501732]
- Kemp AM, Joshi AH, Mann M, et al: What are the clinical and radiological characteristics of spinal injuries from physical abuse: a systematic review. *Arch Dis Child* 95: 355, 2010. [PMID: 19946011]
- Knox J, Schneider J, Wimberly RL, et al: Characteristics of spinal injuries secondary to nonaccidental trauma. *J Pediatr Orthop* 34: 376, 2014. [PMID: 24172665]
- Koumellis P, McConachie NS, Jaspan T: Spinal subdural haematomas in children with non-accidental head injury. *Arch Dis Child* 94: 216, 2009. [PMID: 18713794]