

Block 12 Journal Club Summary Michael A Koroscil

“Is CT cervical Spine scan adequate, or is further MRI needed to look for injury?”

Scenario/Introduction:

A 19 year old male was car surfing when he was thrown from the roof at 35MPH. He is a GCS 5 and intubated prior to getting to the hospital. He arrives in C-collar. CT head and neck were ordered and showed no acute fracture or abnormalities on the CT cervical spine. He remains in collar and when you attempt to remove his C-collar, the Trauma team has a convulsion fit and quickly puts his C-collar back on. At this journal club, we will debate if an MRI is indeed needed after a CT cervical spine is negative in a blunt trauma obtunded patient.

Background Article:

A systematic review of the need for MRI for the clearance of cervical spine injury in obtunded blunt trauma patients after normal cervical spine CT. J James IA, Moukalled A, Yu E, Tulman DB, Bergese SD, Jones CD, Stawicki SP, Evans DC. *Emerg Trauma Shock*. 2014 Oct;7(4):251-5. doi: 10.4103/0974-2700.142611. PubMed PMID: 25400384; PubMed Central PMCID: PMC4231259.

Discussion Articles:

1. Cervical spine collar clearance in the obtunded adult blunt trauma patient: a systematic review and practice management guideline from the Eastern Association for the Surgery of Trauma. Patel MB, Humble SS, Cullinane DC, Day MA, Jawa RS, Devin CJ, Delozier MS, Smith LM, Smith MA, Capella JM, Long AM, Cheng JS, Leath TC, Falck-Ytter Y, Haut ER, Como JJ. *J Trauma Acute Care Surg*. 2015 Feb;78(2):430-41. doi: 10.1097/TA.0000000000000503. Review. PubMed PMID: 25757133; PubMed Central PMCID: PMC4409130.
2. Clinical relevance of magnetic resonance imaging in cervical spine clearance: a prospective study. Resnick S, Inaba K, Karamanos E, Pham M, Byerly S, Talving P, Reddy S, Linnebur M, Demetriades D. *JAMA Surg*. 2014 Sep;149(9):934-9. doi: 10.1001/jamasurg.2014.867. PubMed PMID: 25076462.
3. Computed tomography alone for cervical spine clearance in the unreliable patient--are we there yet? Menaker J, Philp A, Boswell S, Scalea TM. *J Trauma*. 2008 Apr;64(4):898-903; discussion 903-4. doi: 10.1097/TA.0b013e3181674675. PubMed PMID: 18404054.

Background and Discussion Articles Summary Points:

Background. This systematic review looks at 10 years plus of data. It looks back at normal CT C spine in patients, which an MRI was ordered. Only 11 patients of the 1535 had an unstable C spine injury that required surgery. Of the studies in the systematic review the Stassen and Como studies are prospective in nature and have conflicting data. The Stassen Study used data from 2002 and is several years old and likely relies on old CT scan technology. All data is grade 2B but suggest that C collar can be removed if no significant neurological findings are appreciated on exam.

1. The EAST study is relatively new out of JAMA Surgery in 2014. This study looks at 11 articles with an n of 1718. CT scan had a negative predictive value of 100% for

unstable C spine injuries. This study is retrospective in nature. EAST conditionally recommends cervical collar removal after negative CT C spine alone.

2. The study about the clinical relevance of MRI was conducted in southern California from in 2011. 830 patients included, had to be GCS 15 awake and alert. They considered clinically significant injury for patients who needed a HALO or required surgery. Overall 164/830 had CS injury on CT, 23 of the 164 were significant. In all patients with clinically significant MRI findings, CT was also positive for that injury. No clinically significant injuries were missed.

3. The last study from the journal of trauma used a trauma registry from August 2004 to December 2005. 734 patients were identified, 234 with no neurological deficits but unreliable exams. CT scan was a 16-slice scanner. 18 patients of the 234 or about 9% had missed findings on CT picked up by MRI.

Points for Debate:

All of the data are retrospective in nature; only a few prospective trials are included in the systematic reviews. The only study with conflicting data is the study from the Journal of Trauma. According to this study CT misses about 9% of significant injuries. However, this study involved older data and older 16 slice CT scanners. The newer studies involve 64 slice CT scanner and have sensitivities and specificities that approach 100%. This seems to be confirmed with Resnick et al. study, which was a prospective observational trial. Even EAST guidelines are hedging on C-collar removal in an obtunded blunt trauma patient. Obviously “obtunded” is a loosely and ill-defined term and thus, is a point of contention. While multiple studies use large data sets, they are only retrospective in nature. Only a randomized control trial will truly prove if CT alone is sufficient. That being said, multiple retrospective and prospective trials from multiple specialties all are starting to recommend CT alone is sufficient in excluding injury.

Bottom Line:

Technology is advancing everyday. CT scans and their ability to pick up injuries have significantly improved over the last 15 years. A 64-slice CT scan read by an experienced radiologist is nearly 100% sensitive and specific for any significant cervical spine injury and thus, C-collars can be cleared without having to resort to an MRI. 128 and 256 slice scanners are probably around the corner. The data strongly suggest that a CT of the cervical spine alone can exclude any significant C spine injury. Hence, MRI will likely result in increased cost and length of patient stay.