

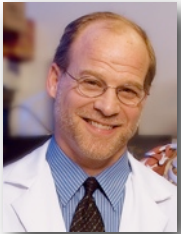
Trauma Rounds

Case Reports from the Mass General Hospital and Brigham & Women's Hospital

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Evaluating the Cervical Spine



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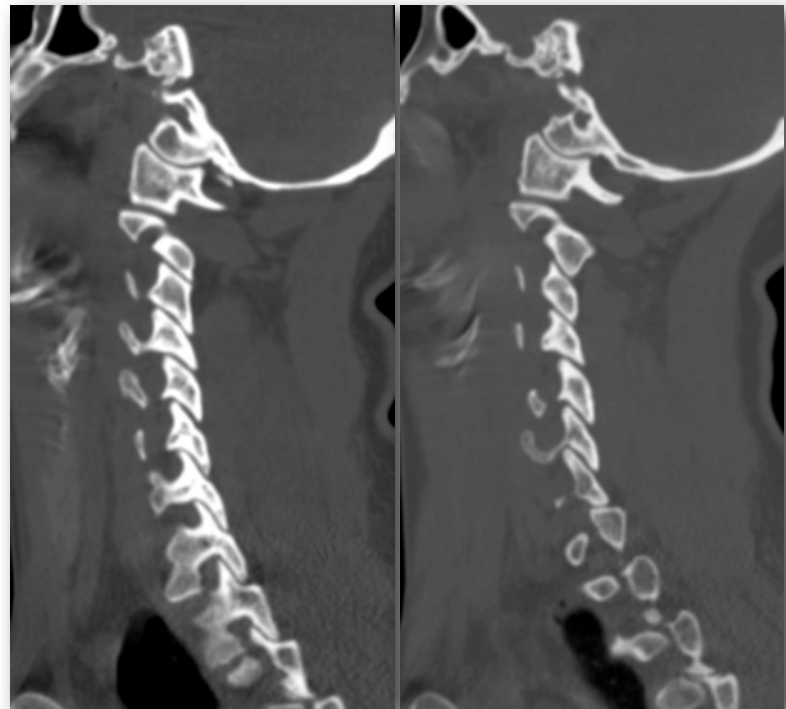
Imagine getting called to the Emergency Department to evaluate a painful and swollen knee after a skiing accident. The plain x-rays are read as *normal*, with no evidence of acute fracture and demonstrate evidence of degenerative arthritis of the knee. If the patient is experiencing too much pain to allow for an adequate exam, a knee brace will be provided and the patient re-evaluated in the office in 7-10 days. If there is significant ligamentous injury, the brace will suffice for temporary stability and a follow-up MRI might be required to fully define the extent of the injury.

Now consider another presentation. This time the mechanism of injury is a fall from standing in an elderly woman and the area of concern is her cervical spine. The patient has a black eye, no history of loss of consciousness and complains of neck pain while in the collar. There are no other associated injuries. Plain x-rays of her cervical spine are read as *normal*, with no evidence of acute fracture and demonstrate evidence of degenerative arthritis of the neck. The questions now are: what should the next tests be, and can the patient be safely discharged in a collar for a follow-up appointment in 1-2 weeks?

Evaluation of the cervical spine can be a difficult process, particularly in a patient who has multiple injuries, is intubated, or who otherwise cannot reliably participate in the physical exam. However, in the patient who is alert, oriented and can participate, a focused physical exam can greatly assist with the initial assessment. An unremarkable exam in association with a pain-free, active range of motion after a low energy injury will often allow the Emergency Department doctor, or the initial consulting physician to *clear the cervical spine* without obtaining screening x-rays. The presence of a *distracting injury* can cloud this process and prompt the need for initial x-rays. A distracting injury can range from a scalp laceration to a fracture of an extremity, with patient-specific relevance.

See associated Bibliography online at:

AchesAndJoints.org/Trauma



Normal appearing Left and Right facets of the cervical spine from MD Computerized Tomography (MDCT) scan.

The presence of drugs or alcohol, an associated major skeletal or visceral injury, or a closed head injury all have the potential to mask the presence of a cervical spine injury. However, a good clinical exam - even if the patient is intoxicated - can help identify the presence of a fracture, and occasionally can provide sufficient evidence to direct the clinician towards a treatment plan prior to obtaining films. Once the credibility of the clinical exam becomes compromised the radiographic evaluation becomes the primary assessment tool.

When films are deemed necessary in the evaluation of the cervical spine, the multi-detector CT (MDCT) scan is the most utilitarian. It has consistently high sensitivity and specificity when identifying cervical fractures. In combination with its axial images, the sagittal and coronal reconstructions are a valuable tool

to assess traumatic soft tissue injuries including posterior ligamentous injuries and facet subluxation. So in the second example above, if films are deemed necessary to assess for a cervical spine injury, MDCT should be preferentially ordered over the traditional *c-spine trauma series* consisting of an AP/ Lateral/ Open mouth dens view.

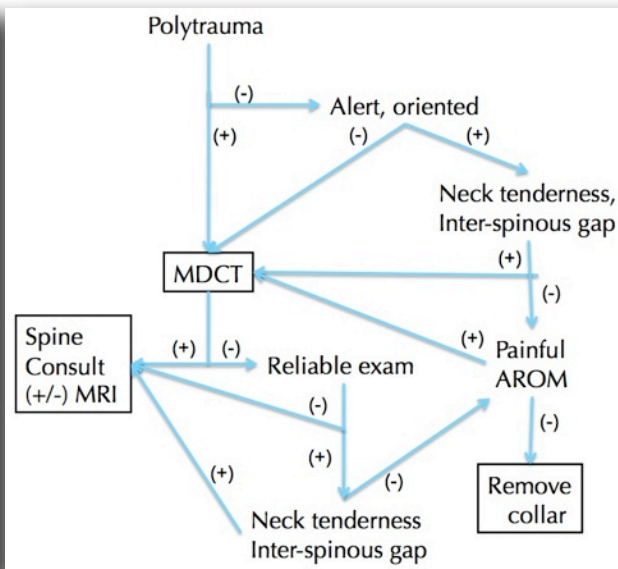
Once the MDCT has been reviewed, the management controversy begins. In the setting of a positive scan a spine consult should be obtained. However, if the MDCT is read as normal with no evidence of an acute fracture and demonstrates evidence of degenerative arthritis of the neck, can the collar be safely discontinued? At this juncture, the safest management option is to carefully perform (or repeat) a focused physical exam. It should start with the evaluation of the midline structures, both bony and ligamentous.

If there are no palpable defects and no appreciable tenderness to palpation, the patient should be asked to laterally rotate his/her head from side-to-side. If this can be performed without pain the patient should be asked to lift his/her head off the bed and bring chin to chest. If this too can be performed without pain, then in the presence of a negative MDCT the collar can be safely discontinued.

However, if there is pain with motion or tenderness with palpation despite the presence of a negative CT, the collar should stay on until a follow-up visit with x-rays 10-14 days later. An upright lateral x-ray in the collar should be carefully reviewed at this follow-up. If there is no sign of deformity, the focused exam should be repeated with the collar off. If uncertainty still exists, active flexion-extension films would be helpful to further assess for an occult ligamentous injury. Flexion-extension films will be optimally useful if the patient is capable of actively moving his/her neck through a full range of motion.



Left: Ligamentum flavum disruption observed in MRI - T2 image.



Right: C-Spine Evaluation Algorithm; Read about the 2/3 Rule in Text

In the setting where the examination remains difficult to interpret or the patient is unable to provide feedback (intubated, intoxicated, closed head injury, drugs, electrolyte imbalance, post-seizure, etc.) an MRI will be valuable to safely allow for removal of the collar. An MRI without evidence of an acute injury and a negative MDCT should consistently provide the greatest assurance that it is safe to remove the collar.

The key to navigating this often-difficult evaluation algorithm is to remember the *2/3 Rule*. If two of the three key evaluation studies (MDCT, MRI and credible physical exam) are negative, a clinically relevant injury will not be missed.

While a spine surgery consult is not often necessary after your initial evaluation, it will be beneficial for you to have a comfortable relationship with your local spine surgeon. These surgeons often have defined protocols for this controversial area of management and can help guide you toward the *best practices*.

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Linda Honeycutt: May 5, 1944 - April 10, 2010
Thank you for all the years you took such good care of our patients & staff. We miss your smile, wit and easy manner.

