Radiologic Approach to Pediatric Cervical Spine Trauma

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Background

- Although cervical spine trauma is a rare occurrence in children, it has the potential for severe neurological consequences including death.
- 1-3% cervical injuries are pediatric
- Associated with worse prognosis in children < 8 years of age due to more frequent neurological deficits & higher mortality rate

C-spine trauma in children <8 years:

- Most commonly cause is MVAs
- Upper cervical spine injuries are frequent, especially C1-C3
- Higher fulcrum with larger head-to-torso ratio, unfused synchondroses, horizontal orientation of facets, flatter vertebral bodies, incomplete spinous process development, weaker musculature & ligamentous laxity.
- Given the increased flexibility of pediatric spine, SCIWORA is almost exclusively seen in young children.
- SCIWORA: Spinal Cord Injury without Radiographic Abnormalities; injury of spinal cord resulting in sensory and/or motor deficits without fracture or dislocation of bony spine

Method

- A literature search of studies done from 2008-2013 on the diagnosis of pediatric cervical spine trauma was conducted
- Keywords including “Pediatric Cervical Spine Trauma” and “Radiography” were used to conduct the literature search
- Information obtained from recent literature on the topic was compiled in order to outline recommendations that can be utilized by health care professionals to diagnose cervical spine trauma in pediatric patients

Objective

To emphasize clinical criteria & imaging studies to diagnose cervical spine trauma in children, while also minimizing the radiation exposure.

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- By age 8, the spine nears maturity & injuries are similar to adults.
- Lower cervical injuries frequent, C5-6
- To injure the spinal cord in older children, a greater force is required compared to young children. Thus, a fracture is often present when the cord is injured.

C-spine trauma in children > 8 years:

- By age 8, the spine nears maturity & injuries are similar to adults.
- Lower cervical injuries frequent, C5-6
- To injure the spinal cord in older children, a greater force is required compared to young children. Thus, a fracture is often present when the cord is injured.

Conclusions

- NEXUS criteria can be adopted in children to evaluate cervical spine trauma; Use may limit radiation exposure through less imaging

Children 8 years old or younger:

- Lateral radiographs used for screening
- When lateral is normal & there is no clinical concern, no imaging is needed
- If CT is used, radiation can be limited by scanning children at high risk & limiting the CT to areas of concern
- Proceed to MRI if symptoms persist & lateral x-ray is normal; CT does not provide additional information in this group
- MRI highly sensitive for soft tissue (ligamentous), and spinal cord injuries

Children > 8 years old:

- Evaluated similar to adults since spine is mature & decreased radiation risk
- Use NEXUS criteria to determine risk
- If no risk factors, no radiographs needed
- If risk factors present, proceed to CT, which is 98% sensitive in this populations compared to lateral radiographs (52%)

References


Additional references upon request.