

## **Cervical Spine Trauma Immobilization Protocols in Young Children: How Often Are These Protocols Followed?**

*Jeffrey Sawyer, MD; Eric Weldy, BS; Derek Kelly, MD; James Beaty, MD;  
David Spence, MD; William Warner Jr, MD;  
University of Tennessee – Campbell Clinic, Germantown, Tennessee, USA*

**Background/Purpose:** Due to the fact that children have a larger head:torso size ratio, positioning them on a standard flat backboard during CT examination will place the cervical spine in a flexed position. This flexed position can lead to exacerbation of a cervical spine injury, especially in unconscious patients in which a neurologic examination cannot be obtained. Backboards with occipital recesses or split mattresses have been developed to alleviate these problems. The purpose of this study is to determine the rate of appropriate positioning of children undergoing cervical spine CT in a high-volume pediatric Level I trauma center.

**Methods:** After IRB approval, the trauma registry was reviewed for all patients age 7 or younger who had a CT scan of the cervical spine as part of a trauma evaluation from 2009-2014. During that time, patient positioning was determined by either emergency medical personnel in the field or the emergency department (ED) team upon arrival to the ED using a pediatric-specific protocol. All consecutive patients with appropriate radiographs were included. Head positioning was determined by measuring the vertical displacement of the occipital protuberance above the plane of the posterior aspect of the thorax on the CT scout view. Patients with the occipital protuberance posterior to the posterior aspect of the thorax were considered to be positioned correctly. The amount of occipital displacement relative to the thorax was recorded.

**Results:** A total of 158 CT scans were obtained, of which 135 (85%) were adequate for review. Of these, 66 (49%) had the occipital protuberance elevated above the level of the posterior thorax, indicating a relative hyperflexion of the cervical spine. The mean anterior displacement of the occipital protuberance was 2.0 cm (range, 0.5-3.4 cm). Of these patients, none had a positioning device used. Of the 69 patients with the occipital protuberance posterior to the thorax, the mean displacement was 1.1 cm posterior (range, 0.2-4.2) to the thorax and all had a positioning device used.

**Conclusion:** Despite having a cervical immobilization protocol and positioning devices, 49% of children presenting to a pediatric Level I trauma center were not positioned correctly for CT imaging. Constant review and education of health-care providers is needed to ensure that cervical spine immobilization protocols are followed in order to prevent unwanted cervical flexion in the young child with suspected cervical spine trauma.

Se:2  
m:1  
SL:-41.0mm

[A]

D. NASSIR, R  
Study Date:10/16/2010  
Study Time:9:08:33 PM  
MRN:  
DOB:  
Sex:

[F]

40 kV  
ST: 1.0mm  
12x512

208.13 mm

43.76 mm

100

[H]

mm

[P]

C45  
W344