

Pediatric cervical spine injury epidemiology

[Pediatric cervical spine injury](#) are relatively rare, accounting for less than 2% of all pediatric trauma cases. The [incidence](#) varies depending on the age group and the cause of [injury](#). Infants and young children are more likely to sustain these injuries from non-accidental trauma, while older children and [adolescents](#) are more likely to experience cervical spine injuries from sports-related accidents or motor vehicle crashes. Boys are also more commonly affected than girls. Overall, the incidence of pediatric cervical spine injuries has decreased over time due to increased [awareness](#), [prevention](#) measures, and advances in medical [management](#).

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A study revealed predominant involvement of the upper cervical spine in children younger than 10 years of age. SCIWORA was documented in both age groups with a significantly higher incidence in younger children ¹⁾.

[Cervical spine injury](#) occurs in 1.5% of injured [children](#).

Associated [mortality](#) rate is nearly 6-fold higher in patients with upper cervical injury.

Seventeen percent of children with [cervical spine trauma](#) show no radiologic anomaly, yet 50% of children with cervical spinal cord injury have no initial radiologic abnormalities.

Of those in whom cervical spine injury is associated with a neurologic deficit, the deficit is complete in 24% of children ²⁾

Cervical spine injuries, are unusual but can be devastating if missed ³⁾.

[Cervical spine fractures](#) in children under school age are very rare, the most common being a fracture

of the base of the dens of the second cervical vertebra. Cervical spine instability is almost always associated with an underlying disease ⁴⁾.

Cervical [spine injury](#) (CSI) is rare in [children](#), accounting for only 1–2% of pediatric trauma. Motor vehicle collisions are the predominant mechanism in children under 8 years old; older children most commonly sustain sports-related injuries ⁵⁾.

Retrospective multicenter studies

A retrospective multicenter study includes all patients up to 16 years suffering from cervical spine injuries who were treated in six German spine centers between 01/2010 and 12/2016. The clinical databases were screened for specific trauma mechanism, level of injury as well as accompanying injuries. Diagnostic imaging and the chosen therapy were analyzed. Patients were divided into three age groups for further evaluation: age group I (0-6 years), age group II (7-9 years), age group III (10-16 years).

Results: A total of 214 children with 265 cervical spine injuries were included during the mentioned period. The mean age at the time of injury was 11.9 (\pm 3.9) years. In age group I, 24 (11.2%) patients were included, age group II consisted of 22 patients (10.3%), and 168 patients belonged to age group III (78.5%). Girls and boys were equally affected. In all age groups, falls and traffic accidents were the most common causes of cervical spine injuries. A total of 180 patients (84.1%) were treated conservatively, while 34 (15.9%) children underwent surgery. Distorsion/whiplash injury was the most common entity ($n = 165$; 68.2%). Children aged 0-9 years had significantly ($p < 0.001$) more frequent injuries of the upper cervical spine (C0-C2) compared to older age groups. Patients of age group III were more likely to suffer from injuries in subaxial localizations. Neurological deficits were rarely seen in all age groups. Head injuries did represent the most common accompanying injuries (39.8%, $n = 92$).

The upper cervical spine was more frequently affected in young children. Older children more often suffered from subaxial pathologies. The majority of cervical spinal column injuries were treated conservatively. Nevertheless, 15% of the hospitalized children had to be treated surgically ⁶⁾.

Prospective observational study

In a rural tertiary hospital in a sub-Saharan African country a prospective observational study of all children with spinal cord injury managed at the center over a 42-month period.

There were 20 patients, 13 males, with a mean age of 11.5 years. Road traffic crash was the etiology in 70% of the cases (motorcycle accident= 45%), and fall from height in 25%. Pedestrians were the victims of the road traffic crash in 42.9% (6/14) of the cases, while 21.4% (3/14) and 28.6% (4/14) were passengers on motorcycles, or in motor vehicles respectively. The cervical spine was the most common location of the injury, occurring alone in 90% of the cases (18/20). Seventy-five percent of the patients (15/20) had transient deficits, but were grossly normal neurologically on examination (ASIA E); 2 patients had ASIA D, while 1 patient each had ASIA C, B, and A injuries. All patients were managed non-operatively. The patients with incomplete deficits improved, while those with complete injury did not make any motor or sensory gains.

Road traffic accident, mostly motorcycle crash, was the most common etiology of pediatric SCI in this series, and most of the injuries were located in the cervical spine. Disabling injury constituted a small proportion of pediatric SCI in our practice ⁷⁾.

Case series

2007

Platzer et al., found 56 pediatric patients with injuries of the cervical spine that met criteria for inclusion. Thirty-one female and 25 male patients with an average age of 8.9 years (range, 1-16 years) sustained significant skeletal and/or nonskeletal injuries of the cervical spine and were entered in this study. Thirty patients (54%) were aged 8 years or fewer and entered into study group A, whereas 26 patients (46%) from the ages of 9 to 16 met criteria for inclusion in study group B. An analysis of data revealed that younger patients (group A) showed significantly more injuries of the upper cervical spine, whereas older children (group B) sustained significantly more injuries of the lower level. Spinal cord injuries without radiographic findings were only found in study group A. In addition, younger children were more likely injured by motor vehicle crashes, whereas older children more commonly sustained C-spine injuries during sports activities. Two-thirds of our patients showed neurologic deficits, and the overall mortality was 28%.

The results of our study were similar to several previous reports, underscoring a low incidence (1.2%) and age-related characteristics. Younger children had a predilection for injuries of the upper cervical spine, whereas children in the older age group sustained significantly more injuries of the lower cervical spine. Spinal cord injuries without radiographic abnormalities were only seen in the younger age group. Despite the low incidence of cervical spine injuries in pediatric patients, increased efforts at prevention are demanded because mortality rate (27%) and incidence of neurologic deficits (66%) were dreadfully high in our series ⁸⁾.

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