

Case Reports & Case Series

Cervical subaxial spine uni-facet dislocation occurring in an infant

Aftab Younus (Dr, FC Orthopedics (SA))^a,
 Adrian Kelly (Dr, MMed Neurosurgery cum laude (SMU), FC Neurosurgery (SA))^{b,*},
 Patrick Lekgwara (FC Neurosurgery (SA)) (Professor)^b

^a Department of Orthopedics, Helen Joseph Hospital, University of the Witwatersrand, Johannesburg, South Africa

^b Department of Neurosurgery, Dr George Mukhari Academic Hospital, Sefako Makgatho Health Sciences University, Pretoria, South Africa



A B S T R A C T

While pediatric spinal injuries account for between 1 and 10% of all spinal injuries < 1% occur in the infant population. In this age group the mechanism of injury described is specific with by far the majority occurring in motor vehicle accidents and in the context of non-accidental injury syndrome. A further characteristic of infant cervical spine injuries is that over five times as many involve the cranio-cervical junction compared to the sub-axial cervical spine. As such this case report gives an account of a very rare occurrence namely an infant whom after an innocuous fall incurred a right cervical C6/C7 uni-facet dislocation.

A six month old male infant presented to our unit with the history that the child had fallen down two stairs whilst in his walker. The child's mother reported that since the event the child was irritable and had pain in his neck that seemed to be getting worse. Examination of the infant's neck revealed a 10 degree rotational deformity to the left and lower cervical posterior midline tenderness. There was no obvious step palpable. The rest of his neurological examination was normal. A computed tomographic scan of his cervical spine confirmed a left C6/C7 uniface dislocation. The uniface dislocation was successfully reduced under conscious sedation, using a halter, with serial imaging being performed. A post-reduction MRI confirmed the successful reduction and excluded cord compression. The infant was placed in a rigid cervical collar for 3 weeks and re-imaged with flexion/extension views. Fortunately the infants imaging excluded instability and he made a full recovery.

In conclusion this case report gives an account of a sub-axial cervical spine injury pattern commonly seen in adults and very rarely encountered in infants. Closed reduction and a cervical brace were used to successfully manage this very rare injury.

1. Introduction

While pediatric spinal injuries account for between 1 and 10% of all spinal injuries < 1% occur in the infant population. In this age group the mechanism of injury described is specific with by far the majority occurring in motor vehicle accidents and in the context of whiplash injury associated with non-accidental injury syndrome. A further characteristic of infant cervical spine injuries is that over five times as many involve the cranio-cervical junction compared to the sub-axial cervical spine. As such this case report gives an account of a very rare occurrence namely an infant whom after an innocuous fall incurred a right cervical C6/C7 uni-facet dislocation.

2. Case description

A six month old male infant presented to the Emergency Department at our institution, accompanied by his mother, with the history that the child had been in his walker and had rolled down 2 stairs where he had come out of the walker and had landed on his head.

There was no history of any loss of consciousness. The child's mother reported that since the event the child was irritable and had pain in his neck that in her opinion seemed to be getting worse. There was no history of vomiting.

On examination the infant was fully conscious and orientated to his surroundings. He had an obvious sub-galeal hematoma on his frontal bone. His cranial nerve examination was normal. Examination of the infant's neck revealed a 10 degree rotational deformity to the left and lower cervical posterior midline tenderness. There was no obvious step palpable. Examination of the infant's motor and sensory systems were normal.

Due to the infant's normal motor and sensory a computed tomographic scan of his cervical spine was requested which confirmed a left C6/C7 uniface dislocation. As cones-calipers are contra-indicated in this age group the child was successfully reduced under conscious sedation, using halter traction, with serial imaging.

A post-reduction MRI confirmed the reduction and excluded cord compression by soft tissue. Post-reduction the infant was placed in a rigid cervical collar for 3 weeks and re-imaged with flexion/extension

* Corresponding author at: Department of Neurosurgery, 3rd floor Sciences Building, Sefako Makgatho Health Sciences University, Garankuwa, Pretoria, South Africa.

E-mail address: adriankelly1000@yahoo.co.uk (A. Kelly).

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views at the time to exclude instability. Fortunately cervical instability was excluded and he made a full recovery.

3. Discussion

As a group infant cervical spine injuries are commonly associated with motor vehicle accidents which account for 40% of the causality [1]. A substantial proportion of the remainder are accounted for by non-accidental injury syndrome as whiplash injuries [1,2]. Sustaining such an injury from falling occurs more commonly in the 2–9 year old age group [1]. Schwartz described a cohort of 8 children whom sustained cervical spine injuries after falling < 5 ft with a mean age of 47 months and a range of 9–68 months however this is considerably higher than this infant, of six months of age, being described [2].

Besides the unusual mechanism of injury, the injury pattern that this infant sustained is extremely unusual and, as per a Pubmed review of the English literature, is the first report of this type of injury occurring in an infant.

In terms of diagnosis Garton and Hammer considered the sensitivity of plain X-rays to diagnose injuries of the spine in the pediatric population and noted that for children < 8 years of age, this was 75% [3]. To improve this, based on increased prevalence of upper cervical spine injuries in younger children especially infants, Garton and Hammer recommend combining plain X-rays with a CT scan from the occiput to C3 [3]. With this combination the sensitivity to detect cervical spine injuries in the < 8 year old age group was 94% [3].

Patel considered pediatric cervical spine injuries from a massive North American computerized database of 75,172 children assessed and noted a 1.5% incidence of cervical spine injury in children which is in keeping with the incidence reported in the literature [4–6]. Patel et al. further noted that dislocations in the upper cervical spine are 5 times more common than the lower cervical spine ($p < 0.001$) [4]. This finding is particularly true the younger the child is and especially relevant for infants [4]. This impressive study concludes with the finding that while upper cervical spine injuries are much more common and occur in all pediatric age groups, lower cervical spine injuries are quite different occurring in older children [4]. In this study 85% of the children with lower cervical spine injuries were older than 8 years [4].

In Schwartz et al. study, previously mentioned, which considered an eight patient cohort with a mean age of 47 months and a range of 9–68 months, we see the same finding being reinforced where three had rotatory subluxations of C1, three had subluxations of C1–C2, and two had C2 fractures, all of which are cranio-cervical cervical spine injuries [2].

Parent et al. performed a systemic review the North American National Pediatric Trauma registry over a 10-year period considering spinal cord injury in the pediatric population and noted in the paper's section on Epidemiology that the level of injury seen differed remarkably based on the age category of the subject [6]. C1/C2 lesions were noted to occur in the pre-teen groups, C4 lesions occurred in the teen group, and C4–C5 lesions were noted to occur in the adult group i.e. over the age of 12 years [6]. This again reinforces the remarkable finding seen in this infant as an extremely unusual injury pattern (see also Figs. 1–4).

A recent study by Kim et al. published in 2016 considered, as a specific sub-set, the infant population. Here again motor vehicle crashes predominate as the injury mechanism, with falls only accounting for 3% of injuries [7]. In this study the commonest cervical spinal level involved was again 0–C2 with lower cervical spine injuries being a rarity [7].

4. Conclusion

This case report gives an account of a male infant whom after an innocuous fall sustained a C6/C7 uni-facet dislocation of his cervical spine. Both this mechanism of injury and injury pattern are extremely



Fig. 1. Sagittal CT of the infant's cervical spine confirming the right C6/C7 uni-facet dislocation.



Fig. 2. Coronal CT of the infant's cervical spine confirming the right C6/C7 uni-facet dislocation.

rare in the infant population. Fortunately the clinicians involved were able to detect and successfully managed this injury resulting in a favorable outcome.

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Conflicts of interest statement

None of the authors listed below have any financial nor personal relationships with other people, or organizations, that could



Fig. 3. Reduction of infant cervical C6/C7 uni-facet dislocation, under conscious sedation, using halter traction.

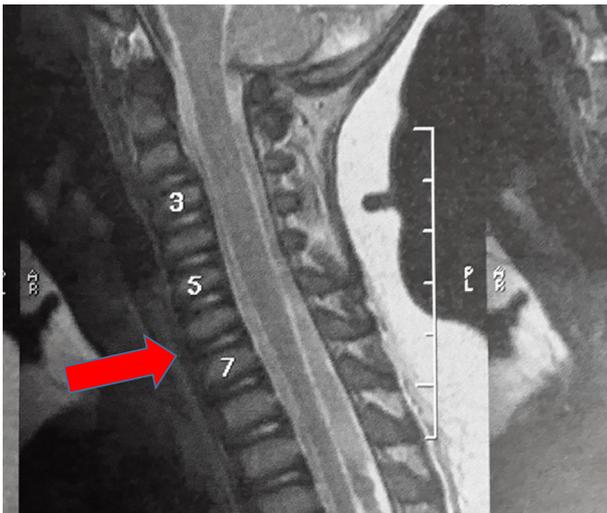


Fig. 4. Immediate post-reduction sagittal MRI confirmed the reduction and excluded cord compression.

inappropriately influence (bias) their work, all within 3 years of the beginning the work submitted.

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