

INTRODUCTION

- Acute quadriparesis is a medical emergency. Stroke, especially in the pediatric population, is a rare cause of acute quadriparesis but an increasingly important etiology to consider.
- 22% of children with acute ischemic strokes (AIS) involve the posterior circulation [1].
- 50% of strokes that involve the posterior circulation are secondary to vertebral artery dissection [2].
- Accurate localization of stroke requires a thorough neurologic examination and deep knowledge of neurovascular anatomy.
- The following case reviews an unexpected but highly important presentation of acute quadriparesis stemming from a posterior circulation lesion in a pediatric patient.

TABLE 1: ETIOLOGIES OF ACUTE QUADRIPLEGIA IN CHILDREN

Vascular	<ul style="list-style-type: none"> • Spinal cord infarction • Spinal cord hemorrhage • Epidural hematoma
Infectious	<ul style="list-style-type: none"> • Bacterial osteomyelitis • Spinal abscess • Human Immunodeficiency Virus • Acute Flaccid Myelitis
Traumatic	<ul style="list-style-type: none"> • Traumatic spine injury
Autoimmune	<ul style="list-style-type: none"> • Transverse Myelitis • Multiple Sclerosis • Systemic Lupus Erythematosus
Metabolic	<ul style="list-style-type: none"> • Vitamin B12 deficiency • Dural Arterio-Venous fistula
Inflammatory	<ul style="list-style-type: none"> • Spondylitis
Neoplasms	<ul style="list-style-type: none"> • Metastatic tumors • Primary tumors
OTHER	<ul style="list-style-type: none"> • Hereditary spastic paraparesis • Decompression syndrome • Degenerative motor neuron disease

CASE PRESENTATION

A 13-year-old girl with no past medical history presented to the emergency department two days after new onset neck pain and difficulty walking. She described that she felt a “pop” on the left side of her neck followed by left upper and lower extremity weakness, difficulty ambulating, and mild sensory changes described as numbness. The acute neck pain was associated with headache, nausea, and vomiting. At home, these symptoms progressed to acute quadriparesis. Neurologic examination revealed weakness of the left upper extremity with effort against gravity in the left upper extremity with distal weakness greater than proximal. Her left lower extremity revealed drift. She had full strength of the right upper extremity and mild drift in the right lower extremity. The patient was hyperreflexic in the right upper and right lower extremity. The finger to nose and heel to shin examination of the patient's left side was confounded due to weakness. Stroke protocol magnetic resonance imaging (MRI) of the brain was obtained along with magnetic resonance angiography (Figure 1). Subsequent MRI of the cervical spine was performed due to additional exam findings (Figure 2). Stroke in the young work up did not reveal any inciting etiologies. Neurologic exam at 1 month follow-up visit still demonstrated mild to moderate (3+ to 4- out of 5) left-sided weakness with no motor deficits noted on the right side. Regarding sensory exam, she had reduced sensation to pinprick in left upper extremity, left lower extremity and right lower extremity. Reflexes were mildly increased in right upper and lower extremities, otherwise no Babinski or clonus was present. Coordination and gait assessment were reported as normal.

IMAGING

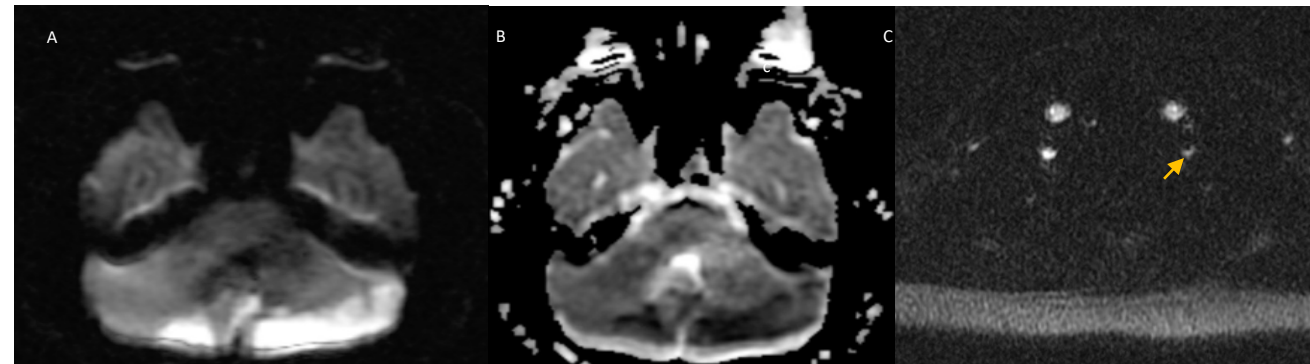


FIGURE 1: Hyperintense signals seen on diffusion weighted image (DWI) with Apparent diffusion coefficient (ADC) correlation (A-B) noted in left greater than right cerebellar regions indicating acute ischemia. Initial Magnetic Resonance Angiography (MRA) of the neck with hypointense signal with irregularity of the left vertebral artery (C).



FIGURE 2: T2 hyperintense signal with restricted diffusion involving the left side of the cervical spinal cord at the level of C3-C4 on axial (A) and sagittal (B,C) cuts.

DISCUSSION

- The presentation of spinal cord infarction secondary to a vertebral artery dissection in a pediatric patient may not be expected but can account for around 50% of posterior circulation strokes [2].
- Cases of posterior circulation deficits may be secondary to pathology involving the vertebral arteries, basilar artery, posterior cerebral arteries or the smaller branches emanating from these main vessels [7].
- Etiologies to consider: Trauma, connective tissue disorders, transient compression, Fibrocartilaginous Embolism

CONCLUSIONS

- Pediatric stroke as a cause of acute quadriparesis secondary to a spinal cord stroke from vertebral artery dissection may contribute to primary symptoms more than most may realize
- Highly associated with trauma and conditions such as Ehlers-Danlos Syndrome, Marfan Syndrome or more rarely, Bow Hunter's Syndrome.
- Increased recognition of stroke in pediatric patients is important as acute interventions can be offered.
- Future guidelines may consider the addition of protocolized cervical spinal cord imaging in cases of suspected vertebral artery dissection.

REFERENCES

1. Carey S, Wrogemann J, Booth FA, Rafay MF. Epidemiology, Clinical Presentation, and Prognosis of Posterior Circulation Ischemic Stroke in Children. *Pediatr Neurol*. 2017 Sep;74:41-50
2. McCrea N, Saunders D, Bagkeris E, Chitre M, Ganesan V. Diagnosis of vertebral artery dissection in childhood posterior circulation arterial/haemorrhagic stroke. *Dev Med Child Neurol*. 2016 Jan;58(1):63-9.
3. Park, K.W., et al., Vertebral artery dissection: natural history, clinical features, and therapeutic considerations. *J Korean Neurosurg Soc*, 2008. 44(3): p. 109-15.
4. Britt, T.B. and S. Agarwal, Vertebral artery dissection. 2017.
5. Rafay, M.F., et al., Craniocervical arterial dissection in children: clinical and radiographic presentation and outcome. *J Child Neurol*, 2006. 21(1): p. 8-16.
6. Tan, M.A., et al., Late Complications of Vertebral Artery Dissection in Children: Pseudoaneurysm, Thrombosis, and Recurrent Stroke. *Journal of Child Neurology*, 2009. 24(3): p. 354-360.
7. Rollins N, et al., Dynamic Arterial Compression in Pediatric Vertebral Artery Dissection. *Stroke*. 2017 Apr;48(4):1070-1075.
8. Susan De la Torre, et al., Spinal Cord Infarct in Pediatric Patient. *Pediatric Stroke*, 2021; 1:63-75.