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Rehabilitation of Cervical Spinal Cord Injury by Os Odontoideum in a Patient with Cerebral Palsy

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Introduction

Os odontoideum (OO) is an independent ossicle separated from the odontoid process and its etiology remains controversial. There are few reports of cervical spinal cord injury by OO in a patient with cerebral palsy and is no consensus on rehabilitation. We provided intensive rehabilitation therapy for a cervical spinal cord injury patient by OO with an athetoid dystonic cerebral palsy and gained neurological and functional recovery after four weeks of treatment.

Case presentation

History : A 32-year-old man with an athetoid dystonic cerebral palsy presented to the hospital with a 3-month history of neuropathic pain, bilateral weakness on upper and lower limbs and functional loss. He had been independent in activities of daily living (ADL) and had been able to walk in a crouch gait with intact cognitive function. Cervical spine dynamic x-ray revealed atlantoaxial instability (Figure 1A). Cervical spine 3D CT and MRI showed compressive myelopathy on C1-2 level with OO (Figure 1B, C). The patient underwent posterior atlantoaxial fusion(Figure 2) and 8 days later, was referred to the department of physical medicine & rehabilitation (PMR). **Initial Examination :** Neurologic examination revealed tetraplegia affecting the most on left upper limb (right upper limb grade 2-3, left upper grade 1-2, both lower grade 2-3 on MRC grade). Hypesthesia was shown below C2/C3 dermatome and hypoalgesia was shown below C4/C4 dermatome. (ASIA impairment scale D) Modified Ashworth scale (MAS) of 1-1+ was checked with ankle clonus. Bulbocavernosus reflex, perianal, and deep anal sensation were preserved. Berg balance scale (BBS) scored 2 and Spinal Cord Independence Measure III (SCIM III) scored 25. Jebsen-Taylor hand function test (JHFT) was uncheckable due to poor trunk control ability and impaired fine motor skills. He suffered from severe orthostatic hypotension symptoms. **Comprehensive Rehabilitation Program :** He had one hour of physical therapy and occupational therapy at gym daily including tilt-table training, sitting balance training, standing balance training, gait training, gross and fine motor training for upper limbs, and basic ADL training. He also practiced sitting, ADL, and bilateral hand training in his patient room after training session. **Post-Rehabilitation and Treatment Outcomes :** After four weeks, he was discharged from hospital with improvement. At discharge, MRC grades were 2-3 on upper limbs and 3-4 on lower limbs. He could stand alone more than 2 minutes and ambulate about 20 meters with maximal assist. SCIM III

scored 43 and BBS scored 26. It was still uncheckable in JHFT with left hand, however, he could finish the task with right hand without time limit.

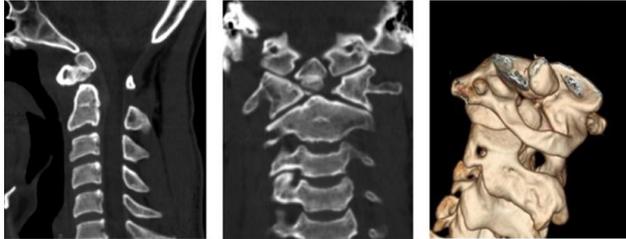
Conclusion

We report a case of cervical cord injury due to OO in a patient with athetoid dystonic cerebral palsy. Prompt and adequate intervention with well-designed rehabilitation program may lessen disabilities and Result in good prognosis.

A. Cervical Spine Radiography



B. Cervical Spine CT



C. Cervical Spine MRI

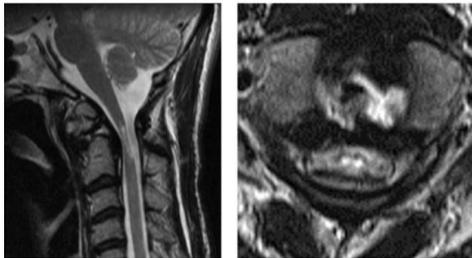


Figure 1. Cervical spine radiographs (A) and cervical spine CT (B) images showing an os odontoideum. Flexion and Extension radiographs (A) demonstrating an C1-C2 instability (Red circle). Cervical spine MRI (C) images showing an unstable C1-C2 region and spinal cord compression at C1-C2 level.

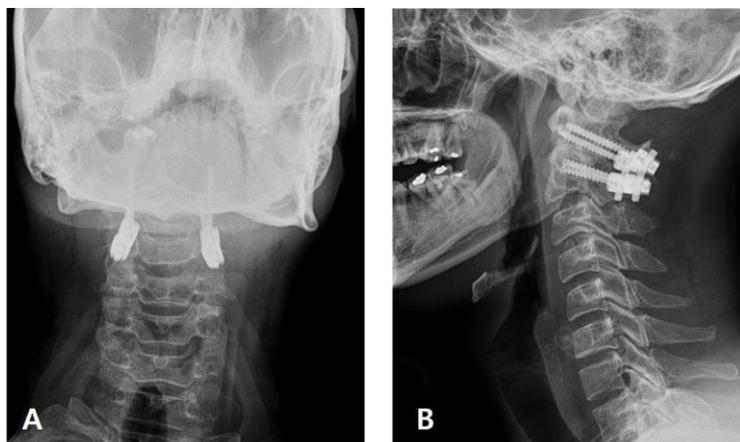


Figure 2. Cervical spine radiography images at 6 weeks postoperatively. The patient underwent posterior fusion on C1 and C2 vertebrae.