

Rehabilitation of Bell's Cruciate Paralysis in Type II Odontoid Fracture: Case Report.

Dr. Zainab Al Lawati, MD, MEd, FRCPC, FAAPMR

CASE DESCRIPTION

A 23-year-old man sustained Type II odontoid fracture with mild anterior displacement and a comminuted displaced fracture along the anterior arch of C1. He underwent posterior cervical fusion of C1-C2. Post op he failed extubation trials eventually requiring Tracheostomy and G tube placement. Once medically stabilized he was transferred to in-patient rehabilitation to address his spinal cord injury rehabilitation issues. His clinical and ASIA exam was completed. He had facial nerve palsy, cervical dystonia and upper extremity weakness with minimal or no involvement of the lower extremities that is consistent with Bell's Cruciate Paralysis. His spasticity, neurogenic bowel and bladder was optimized. Prognosis with his functional status was addressed along with a safe discharge plan.

DISCUSSION

Bell's Cruciate Paralysis is a rare incomplete spinal cord syndrome presenting as upper extremity weakness with minimal or no involvement of the lower extremities. Cranial nerves can be compromised. It usually occurs due to trauma to the axis and/or atlas. Clinical presentation as well as magnetic resonance imaging (MRI) can aid in confirming the diagnosis. Physiatry involvement is vital to facilitate the rehabilitation plan and ensure optimal recovery. Respiratory care is one of the important aspects given the involvement of respiratory muscles such as sternocleidomastoid and the scalene muscles.

Patient might require chemo denervation to manage cervical dystonia. Nutrition can be maintained with PEG tube at the early stages as the upper extremities weakness might interfere with proper feeding. Patient may initially require manual wheelchair to mobilize independently. Prognosis varies depending on patient's premorbid physical endurance, social supports and the mechanism of injury.



MRI showing Cruciate Paralysis

INTERNATIONAL STANDARDS FOR NEUROLOGICAL CLASSIFICATION OF SPINAL CORD INJURY (ISNCSCI)

Patient Name: [REDACTED] Date/Time of Exam: [REDACTED]
Examiner Name: [REDACTED] Signature: [REDACTED]

RIGHT			LEFT			
MOTOR KEY MUSCLES	SENSORY KEY SENSORY POINTS		SENSORY KEY SENSORY POINTS		MOTOR KEY MUSCLES	
	Light Touch (LTR)	Pin Prick (PPR)	Light Touch (LTL)	Pin Prick (PPL)		
C2	0	0	0	0	C2	
C3	0	0	0	0	C3	
C4	0	0	0	0	C4	
C5	0	0	0	0	C5 Elbow flexors	
C6	0	0	0	0	C6 Wrist extensors	
C7	0	0	0	0	C7 Elbow extensors	
C8	0	0	0	0	C8 Finger flexors	
T1	0	0	0	0	T1 Finger abductors (little finger)	
T2	0	0	0	0	MOTOR (SCORING ON REVERSE SIDE)	
T3	0	0	0	0	0 = Total paralysis	
T4	0	0	0	0	1 = Palpable or visible contraction	
T5	0	0	0	0	2 = Active movement, gravity eliminated	
T6	0	0	0	0	3 = Active movement, against gravity	
T7	0	0	0	0	4 = Active movement, against some resistance	
T8	0	0	0	0	5 = Active movement, against full resistance	
T9	0	0	0	0	NT = Not testable	
T10	0	0	0	0	0*...4*, NT* = Non-SCI condition present	
T11	0	0	0	0	SENSORY (SCORING ON REVERSE SIDE)	
T12	0	0	0	0	0 = Absent NT = Not testable	
L1	0	0	0	0	1 = Altered 0*, 1*, NT* = Non-SCI condition present	
L2	5	0	0	0	L2 Hip flexors	
L3	5	0	0	0	L3 Knee extensors	
L4	5	0	0	0	L4 Ankle dorsiflexors	
L5	5	0	0	0	L5 Long toe extensors	
S1	5	0	0	0	S1 Ankle plantar flexors	
S2	0	0	0	0	S2	
S3	0	0	0	0	S3	
S4-5	0	0	0	0	S4-5	
RIGHT TOTALS (MAXIMUM)			LEFT TOTALS (MAXIMUM)			
25 (50) (56) (56)			25 (56) (50) (56)			
MOTOR SUBSCORES			SENSORY SUBSCORES			
UER 0 + UEL 0 = UEMS TOTAL 0	LER 25 + LEL 25 = LEMS TOTAL 50	LTR 0 + LTL 0 = LT TOTAL 0	PPR 0 + PPL 0 = PP TOTAL 0			
MAX (25) (25)	MAX (25) (25)	MAX (56) (56)	MAX (56) (56)			
NEUROLOGICAL LEVELS		3. NEUROLOGICAL LEVEL OF INJURY (NLI)		4. COMPLETE OR INCOMPLETE?		
Steps 1-6 for classification as on reverse		C1		C (In injuries with absent motor OR sensory function in S4-5 only)		
1. SENSORY C1 C1				6. ZONE OF PARTIAL PRESERVATION		
2. MOTOR C1 C1				Most caudal levels with any innervation		
				R L		
				C1 C1		
				S1 S1		

Comments (Non-key Muscles? Reason for NT? Pain? Non-SCI condition?)
Left facial nerve palsy and cervical dystonia

(VAC) Voluntary Anal Contraction (Yes/No) No (DAP) Deep Anal Pressure (Yes/No) No

This form may be copied freely but should not be altered without permission from the American Spinal Injury Association. REV 04/19

Initial INSCSCI exam

CONCLUSION

Cruciate Paralysis is an important cause of brachial diplegia and must be differentiated from acute Central Cord syndrome which can have similar clinical features. Cranial nerve injury can be involved. This report illustrates the significance of Physiatry involvement in high spinal cord injuries and the ability to detect rare injuries and ensure adequate and appropriate management in a timely manner.

REFERENCE

- Huelke DF, O'Day J, Mendelson RA. Cervical injuries suffered in automobile crashes. J Neurosurg 1989;54:316-22.
- Anderson LD, D'Alonzo RT. Fractures of the odontoid process of the axis. J Bone Joint Surg (Am). 1974;56:1663-74.
- Stillerman CB, Roy RS, Weis MH. Cervical spine injuries: Diagnosis and treatment. In Wilkins RH, Rengachary SS (eds) Neurosurgery Vol II, Ed 2. 2875-2904.
- Mansukhani SA, Tuteja SV, Dhar SB. Cruciate Paralysis in a 20-year-old Male with an Undisplaced Type III Odontoid Fracture. Journal of Orthopaedic Case Reports 2016 April - June;6(2)