

## In Traumatic Upper Cervical Spinal Cord Injuries, Intramedullary Lesion Length on MRI, Age, and Depressed Level of Consciousness Have a Significant Effect on Survival

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Introduction: Spinal cord injury (SCI) following upper cervical spinel fracture dislocations is unusual; however in the presence of SCI, mortality is well over 50 percent. We examined major contributors to mortality.

Methods: Relevant clinical, imaging, management and follow-up variables of 73 patients with upper cervical spine fracture dislocations and SCI verified by MRI were analyzed to find predictors of mortality during acute care and over a 6-month follow-up. Analysis was by logistic regression.

Results: Mean age was 60.2 (SD=19.1) and 65 (89%) patients suffered a fall or motor vehicle accident. Admission injury severity score was 45 (SD=29) and GCS score 9.7 (SD=5.0). Morphology indicated fractures of atlas in 25, axis in 60 and vertical or horizontal translation in 6. In six patients there was no CT and MRI evidence of bony or ligamentous injury. Axis fractures included odontoid fractures in 46 and C2 body fractures in 14. Intramedullary lesion length (IMLL) on MRI measured 34.6 millimeters (SD=24.9) and 42 patients indicated intramedullary hemorrhage at the injury epicenter (Figure 1). Injury epicenter was primarily in mid-axial level (Figure 2). Forty patients died in this series of which 20 deaths were during follow-up. Three distinct groups of patients were encountered in this investigation. Mortality in 29 motor incomplete SCI patients was 24% (Figure 3); in 25 motor complete patients 75% (Figure 1) and in 20 patients with altered mental status 80%. IMLL in these 3 groups of patients was 22.9, 51.6, and 32 mm respectively (Figure 4). Multivariate regression analysis indicated that longer IMLL (P<0.01), higher age (P<0.01) and lower admission GCS score (P<0.001) increased mortality.

Conclusions: In traumatic upper cervical spine (C1-C3) fracture dislocations associated with spinal cord injury age, level of consciousness and IMLL were independent predictors of patient's survival.



Fig 1-73-male with ODII fracture and complete SCI. IMLL was 52.5 mm and there was evidence of intramedullary bleeding at the injury epicenter. The patient died shortly after admission



Figure 3-Schematic representation of aggregates of injury epicenters in 73 patients with upper CSCI. Black dots indicate patients who died.



Figure 2-43-male with TBI and incomplete SCI at the level of a C2 body fracture. Intramedullary lesion length was 31.9 mm. The patient was treated with halo-vest and 1year following truama his AMS was 100 with lack of desterity of his hands.



The relationship between injury severity, IMLL and mortality in 73 patients with C1-C3 fracture dislocations and SCI

Objectives: This investigation explores some of the unanswered causes of high mortality in traumatic C1 -C3 fracture dislocations associated with SCI.

References.1-3

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