

## Fatal Hyperextension Cervical Spine Injury due to Unusual Fall

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### Abstract

Cervical spine fracture is commonly reported trauma due to fall in elderly. This article presents a case of hyperextension injury of neck in an elder subsequent to slip and fall in an unusual prone position, and stress the importance of complete autopsy examination, death scene photographs and toxicological analysis in such cases.

**Keywords:** Neck injuries; Spinal injuries; Neck dissection; Accidental fall; Autopsy.

### Introduction

Cervical spine injury is relatively rare and its fatality is less often reported. Cervical spine fracture caused by trauma includes accidental or suicidal falls, traffic accidents, sport accidents, hanging, diving, fall of a heavy object onto the head or neck, bull attack, blunt or penetrating assault etc.<sup>1-8</sup> Cervical spine fractures are reported to be common in males than females.<sup>1-5</sup> It is mostly noticed among age group 15-45 years, followed by 65 - 80 years.<sup>2,3,6</sup> Fall either from height or at same level have been reported to be frequent cause of cervical spine injury following motor vehicular accidents.<sup>1,2</sup> Prevalence of fatal cervical spine fracture in association with fall increases monotonically with increasing age.<sup>1,3,6,9</sup> We report here a case of unusual fall of an elderly man which resulted in hyper extension injury of the neck with cervical spine fracture with no other associated major injuries.

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### Case report

The dead body of a 65-years-old man was brought to mortuary, department of forensic medicine and toxicology for postmortem examination by investigation police officer under suspicious circumstances of death. According to the inquest by the investigation officer, the deceased, watchman by occupation was residing alone in his room in first floor. The incidence happened when his owner's family were on vacation in weekend. When they returned, they noticed his dead body lying in room opposite to his room. The scene of death photographs provided by the investigation officer depicted the deceased in unusual prone position with body leaning on the floor and head on the wall with hyperextension of neck (Fig. 1).



**Fig. 1:** Position of the deceased at the scene of death.

At autopsy, external examination showed features of decomposition. Face was swollen, abdomen was distended with putrefactive gases. Marbling was noticed over front and lateral aspect of abdomen and thigh (Fig. 2). Blisters and peeling of skin was present over front and back of chest and abdomen. Pressure abrasion of size 4 cm x 2 cm present on right side of face over malar eminence (Fig. 3). Abrasion of size 8 cm x 5 cm was present on lateral aspect of right arm, 6 cm below the tip of right shoulder. Abrasion of size 3 cm x 1 cm present on lateral aspect of right elbow. On



Fig. 2: Marbling on lateral aspect of abdomen and thigh on right side.



Fig. 3: Pressure abrasion on right side of the face.



Fig. 4: Fracture-dislocation of body of C5 cervical vertebrae.

internal examination, fracture-dislocation of body of C5 cervical vertebrae was noted (Fig. 4). No other internal injuries were noted. The viscera were preserved and sent to forensic science laboratory for toxicological analysis which reported the presence of alcohol. The cause of death was opined as 'death due to cervical spine injury'.

## Discussion

Cervical spine injury due to fall is common above 65 years of age.<sup>1,3,6,9</sup> Fracture of C5 and C6 cervical vertebrae are commonly involved.<sup>1,7,10</sup> The cervical spine injury revealed in our postmortem examination of deceased following the impact of the face or the forehead subsequent to fall or slip from a low height occurs on occasion. Such a common association of cervical spine fracture with facial or frontal trauma has been reported earlier.<sup>2,10-12</sup> Hyperextension injuries to cervical spine due to fall as observed in our case have been mentioned by other authors.<sup>13-15</sup> Although rare, cervical spine injury, which is potentially overlooked during external postmortem examination, should be investigated by meticulous neck dissection in such cases. The cervical spine must be suspected and examined carefully, whenever facial injuries are present. As seen in our case, incidence of such accidental acute deaths in elderly due to fall under influence of alcohol was also reported.<sup>13</sup>

Cervical spine injuries occur when the load extends beyond the physiologic range of backward motion or when extension causes posterior compression and anterior distraction. Hyperextension may occur in combination with lateral tilting or rotational forces, resulting in additional patterns of injury.<sup>16</sup> When the neck goes into hyperextension, force is first directed backward and then downward, and, further, finally in a forward direction. The relatively inelastic anterior longitudinal ligament may rupture, and the articular processes or pedicles are compressed and fractured.<sup>15</sup> In our cases, hyperextension in combination with rotational or lateral forces have resulted in the cervical spine fracture.

## Conclusion

This case emphasizes the importance of photographs of the undisturbed death scene, in addition to a full autopsy and toxicological analysis in order to confirm suspected manner of death in cervical spine fracture.

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## References

1. Fredø HL, Rizvi SA, Lied B, Rønning P, Helseth E. The epidemiology of traumatic cervical spine fractures: a prospective population study from Norway. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine*. 2012 Dec;20(1):85.
2. Clayton JL, Harris MB, Weintraub SL, Marr AB, Timmer J, Stuke LE, McSwain NE, Duchesne JC, Hunt JP. Risk factors for cervical spine injury. *Injury*. 2012 Apr 1;43(4):431-5.
3. Lowery DW, Wald MM, Browne BJ, Tigges S, Hoffman JR, Mower WR, NEXUS Group. Epidemiology of cervical spine injury victims. *Annals of emergency medicine*. 2001 Jul 1;38(1):12-6.
4. Sanchez B, Waxman K, Jones T, Conner S, Chung R, Becerra S. Cervical spine clearance in blunt trauma: evaluation of a computed tomography-based protocol. *Journal of Trauma and Acute Care Surgery*. 2005 Jul 1;59(1):179-83.
5. Thompson WL, Stiell IG, Clement CM, Brison RJ, Canadian C-Spine Rule Study Group. Association of injury mechanism with the risk of cervical spine fractures. *Canadian journal of emergency medicine*. 2009 Jan;11(1):14-22.
6. Leucht P, Fischer K, Muhr G, Mueller EJ. Epidemiology of traumatic spine fractures. *Injury*. 2009 Feb 1;40(2):166-72.
7. Hoque MF, Hasan Z, Razzak AT, Helal SU. Cervical spinal cord injury due to fall while carrying heavy load on head: a problem in Bangladesh. *Spinal Cord*. 2012 Apr;50(4):275-7.
8. Rhee P, Kuncir EJ, Johnson L, Brown C, Velmahos G, Martin M, Wang D, Salim A, Doucet J, Kennedy S, Demetriades D. Cervical spine injury is highly dependent on the mechanism of injury following blunt and penetrating assault. *Journal of Trauma and Acute Care Surgery*. 2006 Nov 1;61(5):1166-70.
9. Pickett GE, Campos-Benitez M, Keller JL, Duggal N. Epidemiology of traumatic spinal cord injury in Canada. *Spine*. 2006 Apr 1;31(7):799-805.
10. Goldberg W, Mueller C, Panacek E, Tigges S, Hoffman JR, Mower WR, NEXUS Group. Distribution and patterns of blunt traumatic cervical spine injury. *Annals of emergency medicine*. 2001 Jul 1;38(1):17-21.
11. Jeanmonod R, Pester J, Jeanmonod D. Face Trauma is a Predictor of Cervical Spine Injury in Elderly Fall Patients Who Meet Trauma Alert Criteria. *Annals of Emergency Medicine*. 2013;4(62):S65-6.
12. Hackl W, Fink C, Hausberger K, Ulmer H, Gassner R. The incidence of combined facial and cervical spine injuries. *Journal of Trauma and Acute Care Surgery*. 2001 Jan 1;50(1):41-5.
13. Osawa M, Satoh F, Hasegawa I. Acute death due to hyperextension injury of the cervical spine caused by falling and slipping onto the face. *Journal of forensic and legal medicine*. 2008 Oct 1;15(7):457-61.
14. Aarabi B, Koltz M, Ibrahimi D. Hyperextension cervical spine injuries and traumatic central cord syndrome. *Neurosurgical focus*. 2008 Nov 1;25(5):E9.
15. Kinoshita H. Pathology of hyperextension injuries of the cervical spine. *Spinal Cord*. 1994 Jun;32(6):367-74.
16. Rao SK, Wasyliw C, Nunez Jr DB. Spectrum of imaging findings in hyperextension injuries of the neck. *Radiographics*. 2005 Sep;25(5):1239-54.

