Cervical Spine Immobilization After Penetrating Trauma to the Head and Neck

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Background

C-collars May Result In Adverse Effects:

- Skin breakdown
- Elevated intracranial pressures
- Increased ventilator time
- Increased intensive care unit days
- Longer hospital stays

Prehospital Trauma Life Support Recommendation:

"Spinal immobilization may be performed after penetrating injury when a focal neurologic deficit is noted on physical examination although there is little evidence of benefit even in these cases."

Hypothesis

Patients with stab wounds (SW) will have a lower incidence of cervical spinal column injury than patients with gunshot wounds (GSW).

Methods

Retrospective analysis of all patients who presented to an urban trauma center between January 2010 - January 2014 with a penetrating injury to the head or neck.

Variables Collected:

- *Patient demographics*
- *Date of injury*
- *Wound location*
- *Loss of consciousness*
- *Initial neurologic exam*
- *Imaging Results:*
  - *Vertebral fracture*
  - *Spinal cord injury*
- *Treatment (surgery, halo, collar, none)*
- *Discharge neurologic exam*
- *Mortality*
  - *Mortality prior to spinal evaluation*

Analysis:
Penetrating wounds were stratified into stab wounds vs. gunshot wounds and compared using Pearson's Chi squared test.

Results

172 patients had penetrating injury to the head and/or neck:

Characteristic	N=172	%
Male Gender	153	89%
Age (years, SD)	34.5	±14.9
Mechanism		
GSW	48	28%
Stab	124	72%
Location		
Head	84	49%
Neck	106	62%
Head and Neck	19	11%

Clinical Outcomes	N=172	%
Mortality	24	14%
Mortality prior to imaging or clinical evaluation	16	9%
C-spine evaluated and fracture identified	6	4%
Fracture after stab wound (n=120)	1	0.8%
Fracture after GSW (n=36)	5	13.8%

	Patient Injuries and Clinical Descriptions	Initial GCS	Initial / Discharge Neuro Exam	Treatment	Mortality
1	**GSW to face** • C1 transverse process fracture, air in spinal canal. • Pseudoaneurysm of the carotid artery • Transferred for neurointerventional radiology	3	Unable / Unknown	None	No
2	**GSWs to face and neck** • Right C1 vertebral arch fracture, vertebral artery spasm • Discharged to home with Halo, with no neurologic deficit	15	Normal / Normal	Halo	No
3	**GSW to left face, maxillary area** • Displaced fracture to L transverse process of C1 • Expired on HD 0	3	Unable / Death	None	Yes
4	**GSW to zone II of neck** • Fractures of C5 transverse process, pedicle, spinous process, and C6 superior facet • Expired after a protracted hospital course	3	Unable / Quad	Collar	Yes
5	**GSWs to neck and legs** • Fractures of C2, C3, C4 transverse processes, spinous process of C4 and superior facet of C4 • MRI showed cord contusion at C3/C4 • Discharged to acute rehab	3	Unable / UE & LE weakness	Collar	No
6	**Stab Wound to zone II of neck** • Teardrop fracture at C6 • MRI showed normal spinal cord	15	Normal / Normal	None	No

Conclusions

- Of patients with a GSW to the head and/or neck that survived to be evaluated, 5 (13.8%) had CS fracture. Cervical spine immobilization is appropriate in this population.
- Of patients with a SW to the head and/or neck that survived to be evaluated, 1 (0.8%), had a fracture after a stab wound. The patient showed no neurological deficit, had no spinal cord injury, and received no treatment for the fracture.
- Further research may allow providers to forego cervical spine immobilization in patients with stab wounds to the head and/or neck.

References

1. Como JJ, Diaz JJ, Dunham CM, Chiu WC, Duane TM, Capella JM, Holevar MR, Khwaja KA, Mayglothling JA, Shapiro MB, et al. Practice management guidelines for identification of cervical spine injuries following trauma: update from the eastern association for the surgery of trauma practice management guidelines committee. J Trauma. 2009 Sep;67(3):651-9.
2. Stuke LE, Pons PT, Guy JS, Chapleau WP, Butler FK, McSwain NE. Prehospital spine immobilization for penetrating trauma--review and recommendations from the Prehospital Trauma Life Support Executive Committee. J Trauma. 2011 Sep;71(3):763-9.
3. Powers J, Daniels D, McGuire C, Hilbish C. The incidence of skin breakdown associated with the use of cervical collars. *J Trauma Nurs*. 2006;13:198-200.
4. Hunt K, Hallworth S, Smith M. The effects of rigid collar placement on intracranial and cerebral perfusion pressures. *Anaesthesia*. 2001;56:511-513.
5. Haut ER, Kalish BT, Efron DT, Haider AH, Stevens KA, Kieninger AN, Cornwell EE 3rd, Chang DC. Spine immobilization in penetrating trauma: more harm than good? J Trauma. 2010 Jan;68(1):115-20.
6. Hunt K, Hallworth S, Smith M. The effects of rigid collar placement on intracranial and cerebral perfusion pressures. *Anaesthesia*. 2001;56:511-513.