

## Supplementary material

Tables and Figures

**Table 1. Characteristics of the CSI Study Population**

<b>Total study population</b>	688
Patients with any BCVI	80
With CA BCVI	37
With VA BCVI	43
Age mean (SD)	51.3 ± 21.6
Male	485 (70.5%)
Female	203 (29.5%)
ISS mean (SD)	19.1 ± 14.3
GCS mean (SD)	12.4 ± 4.3

BCVI, blunt cerebrovascular injury; CA, carotid artery; VA, vertebral artery; SD, standard deviation; ISS, injury severity score; GCS, Glasgow Coma Scale

**Table 2. Factors for BCVI with counts, odds ratio (OR) and significance levels for chi-square statistics.**

Variable	Total study cases	BCVI		OR	$\chi^2$ p	95% CI	
		(+)	(-)			Lower	Upper
C-spine injury (any)	688	43	645	<b>26.3</b>	<b>&lt;0.0001</b>	16.84	41.12
C-spine ligamentous injury	34	8	26	<b>5.4</b>	<b>0.0007</b>	2.30	12.89
C-spine Atlanto-axial (odontoid) fx	13	1	12	1.26	0.83	0.16	9.89
C-spine facet fx	35	4	31	2.03	0.203	0.68	6.04
C-spine trans. foramen fx	37	0	37	-	-	-	-
Sex	-	-	-	0.86	0.65	0.44	1.66
ISS <sup>a</sup> median (SD)	-	23 ± 11.8	20.7 ± 12.8	<b>1.03</b>	<b>0.001</b>	1.01	1.05
GCS <sup>a</sup> median (SD)	-	12.2 ± 4.2	12.1 ± 4.4	1.30	0.164	0.90	1.90
Age median(SD)	-	54.8 ± 12.2	53.6 ± 2	1.01	0.12	0.99	1.03

Bolded values are variables that are statistically significant.

Unadjusted odds ratio (OR) from univariate analysis.

Total study cases refer to the number of patients with a positive variable.

a = these quantities represent the multiplicative change in odds for a one-unit or one-group increase. C-spine = cervical spine; C-spine ligamentous injury = identified through AIS-codes; GCS = Glasgow Coma Scale; ISS = Injury Severity Score; SD = Standard Deviation.

**Table 3. Multivariate Analysis of Predictive Factors for BCVI**

<i>Variable</i>	<i>Crude OR</i>	<i>95% CI</i>	<i>P</i>	<i>Adjusted OR</i>	<i>95% CI</i>	<i>P</i>
C-spine injury (any)	<b>26.3</b>	16.84-41.12	<b>&lt;0.0001</b>	<b>8.41</b>	4.84-14.59	<b>&lt;0.0001</b>
C-spine ligamentous injury	<b>5.4</b>	2.30-12.89	<b>0.0007</b>	<b>5.40</b>	2.10-13.91	<b>&lt;0.0001</b>
C-spine facet fx	2.03	0.68-6.04	0.203	2.35	0.74-7.47	0.146
ISS <sup>a</sup>	<b>1.03</b>	1.01-1.05	<b>0.001</b>	<b>1.03</b>	1.01-1.04	<b>0.001</b>
GCS <sup>a</sup>	1.30	0.90-1.90	0.164	0.96	0.91-1.02	0.153
Age	1.01	0.99-1.03	0.12	1.00	0.99-1.01	0.6

Bolded values are variables that are statistically significant.

Unadjusted odds ratio (OR) from univariate analysis and adjusted OR from multivariate analysis.

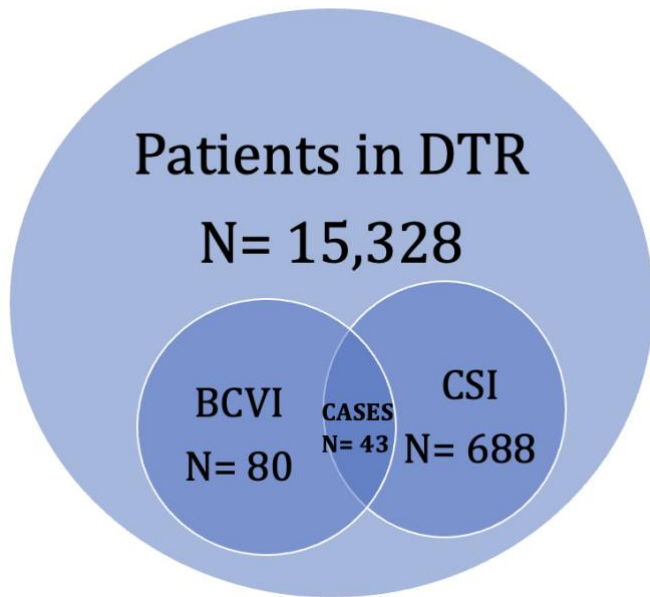
a = these quantities represent the multiplicative change in odds for a one-unit or one-group increase. C-spine = cervical spine; C-spine ligamentous injury = identified through AIS-codes; GCS = Glasgow Coma Scale; ISS = Injury Severity Score.

**Table 4 - Glasgow Coma Scale (GCS) characteristics**

	Number	%
GCS		
≥14	525	78.95
9-12	35	5.3
≤8	105	15.8 <sup>a</sup>

a: 23 missing values

Figure 1 Patient identification through DTR



Supplementary Table 1 - Included AIS-codes for Cervical Spine Injuries

<b>AIS-code</b>	<b>Injury description</b>
600999.9	Injuri e to the spine - died
640200.3	<b>Cord</b> contusion - NFS
640201.3	<b>Cord</b> contusion - with transient neurological signs, but NFS to fracture/dislocation
640202.3	<b>Cord</b> contusion - with transient neurological signs with no fracture or dislocation
640204.3	<b>Cord</b> contusion - with transient neurological signs with fracture
640208.3	<b>Cord</b> contusion - with transient neurological signs with both fracture and dislocation
640210.4	<b>Cord</b> contusion - Incomplete cord syndrome, but NFS fracture/dislocation
640212.4	<b>Cord</b> contusion - Incomplete cord syndrome with no fracture or dislocation
640214.4	<b>Cord</b> contusion - Incomplete cord syndrome with fracture
640218.4	<b>Cord</b> contusion - Incomplete cord syndrome with both fracture and dislocation
640220.5	<b>Cord</b> contusion - Complete cord syndrome
640224.5	<b>Cord</b> contusion - Complete cord syndrome C-4 or below with fracture
640229.6	<b>Cord</b> contusion - Complete cord syndrome C-3 or above, but NFS as to fracture/dislocation or NFS as to site
640246.5	<b>Cord</b> laceration - with fracture
640250.5	<b>Cord</b> laceration - with both fracture and dislocation
640260.5	<b>Cord</b> laceration - Complete cord syndrome NFS
640272.6	<b>Cord</b> laceration - Complete cord syndrome C-3 or above with fracture
640276.6	<b>Cord</b> laceration - Complete cord syndrome C-3 or above with both fracture and dislocation
640278.1	Strain, acute, with no fracture or dislocation
640284.1	<b>Spinous ligament</b> injury
650204.2	Dislocation [subluxation], no fracture, no cord involvement NFS
650205.3	<b>Disc</b> injury - Rupture
650206.3	<b>Atlanto-axial (odontoid)</b>
650209.2	<b>Facet</b> NFS
650212.3	<b>Facet</b> - bilateral
650216.2	Fracture with or without dislocation but no cord involvement NFS
650217.2	Fracture with or without dislocation but no cord involvement - Multiple fractures of same <b>vertebra</b>
650218.2	Fracture with or without dislocation but no cord involvement - <b>Spinous process</b>
650220.2	Fracture with or without dislocation but no cord involvement - <b>Transverse process</b>
650222.2	Fracture with or without dislocation but no cord involvement - <b>Facet</b>
650224.2	Fracture with or without dislocation but no cord involvement - <b>Lamina</b>
650226.2	Fracture with or without dislocation but no cord involvement - <b>Pedicle</b>
650228.2	Fracture with or without dislocation but no cord involvement - <b>Odontoid (dens)</b>
650230.2	Fracture with or without dislocation but no cord involvement - <b>Vertebral body</b> NFS (“burst” fracture)
650232.2	Fracture with or without dislocation but no cord involvement - <b>Vertebral body</b> NFS (“burst” fracture), Minor compression ( $\leq 20\%$ loss of anterior height)
650234.3	Fracture with or without dislocation but no cord involvement - <b>Vertebral body</b> NFS (“burst” fracture), Major compression ( $>20\%$ loss of anterior height)

Supplementary Table 2 - Included AIS-codes for Vascular Injuries

Ais-Code	Injury description
320099.9	<b>Vascular injurie in neck NFS</b>
320299.3 320202.3 320204.4 320206.3 320208.3 320209.3 320210.4 320211.4 320212.4 320213.4 320214.5 320215.5 320216.3 320217.3 320218.4 320219.4 320220.3 320221.3 320222.4 320223.4	<b>Carotid artery [common, internal] NFS</b> <ul style="list-style-type: none"> <li>- Intimal tear, no disruption               <ul style="list-style-type: none"> <li>○ Neurological deficit (stroke) not head-injury related</li> </ul> </li> <li>- Laceration; perforation; puncture NFS               <ul style="list-style-type: none"> <li>○ Minor; superficial; incomplete circumferential involvement; Blood loss ≤20% by volume                   <ul style="list-style-type: none"> <li>▪ Bilateral</li> <li>▪ Neurological deficit (stroke) not head-injurie related                       <ul style="list-style-type: none"> <li>• Bilateral</li> </ul> </li> </ul> </li> <li>○ Major; rupture; transection; segmental loss: blood loss &gt;20% by volume                   <ul style="list-style-type: none"> <li>▪ Bilateral</li> <li>▪ Neurological deficit (stroke) not head-injurie related                       <ul style="list-style-type: none"> <li>• Bilateral</li> </ul> </li> </ul> </li> <li>○ With thrombosis (occlusion) secondary to trauma                   <ul style="list-style-type: none"> <li>▪ Bilateral</li> <li>▪ Neurological deficit (stroke) not head-injurie related                       <ul style="list-style-type: none"> <li>• Bilateral</li> </ul> </li> </ul> </li> </ul> </li> <li>- Thrombosis (occlusion) secondary to trauma from any lesion but laceration               <ul style="list-style-type: none"> <li>○ Bilateral</li> <li>○ Neurological deficit (stroke) not head-injurie related                   <ul style="list-style-type: none"> <li>▪ Bilateral</li> </ul> </li> </ul> </li> </ul>
<b>320499.2</b> <b>320402.2</b> <b>320404.2</b> <b>320406.2</b> <b>320408.3</b> <b>320410.2</b> <b>320412.2</b>	<b>Carotid artery [external] NFS</b> [includes <b>thyroid</b> ] <ul style="list-style-type: none"> <li>- Intimal tear, no disruption</li> <li>- Laceration; perforation; puncture NFS               <ul style="list-style-type: none"> <li>○ Minor; superficial; incomplete circumferential involvement; blood loss ≤20% by volume</li> <li>○ Major; rupture; transection; segmental loss; blood loss &gt;20% by volume</li> <li>○ With thrombosis; (occlusion) secondary to trauma</li> </ul> </li> <li>- Thrombosis (occlusion) secondary to trauma from any lesion but laceration</li> </ul>

<b>321099.2</b>	<b>Vertebral artery NFS</b>
<b>321002.2</b>	- Intimal tear, no disruption
<b>321004.3</b>	○ Neurological deficit (stroke) not head-injury related
<b>321006.2</b>	- Laceration; perforation; puncture NFS
<b>321008.2</b>	○ Minor; superficial; incomplete circumferential involvement; blood loss ≤20% by volume
<b>321010.3</b>	▪ Neurological deficit (stroke) not head-injury related
<b>321012.3</b>	○ Major; rupture; transection; segmental loss: blood loss >20% by volume
	▪ Neurological deficit (stroke) not head-injury related
<b>321014.4</b>	• Bilateral
<b>321015.5</b>	○ With thrombosis (occlusion) secondary to trauma
<b>321016.4</b>	▪ Bilateral
<b>321017.5</b>	- Thrombosis (occlusion) secondary to trauma from any lesion but laceration
<b>321018.3</b>	○ Neurological deficit (stroke) not head-injury related
	▪ Bilateral
<b>321020.4</b>	
<b>321021.5</b>	