Epidemiology and predictors of traumatic spine injury in severely injured patients: implications for emergency procedures

David Häse1,2, D. · Rolf Lefering3 · Jan-Philipp Stock4 · Michael Kreinst5 · The TraumaRegister DGU6

Received: 29 July 2020 / Accepted: 25 September 2020
© The Author(s) 2020

Abstract

Purpose This study aimed to identify the prevalence and predictors of spinal injuries that are suitable for immobilization.

Methods Retrospective cohort study drawing from the multi-center database of the TraumaRegister DGU®, spinal injury patients ≥ 16 years of age who scored ≥ 3 on the Abbreviated Injury Scale (AIS) between 2009 and 2016 were enrolled.

Results The mean age of the 145,833 patients enrolled was 52.7 ± 21.1 years. The hospital mortality rate was 13.9%, and the mean injury severity score (ISS) was 21.8 ± 11.8. Seventy percent of patients had no spine injury, 25.9% scored 2–3 on the AIS, and 4.1% scored 4–6 on the AIS. Among patients with isolated traumatic brain injury (TBI), 26.8% had spinal injuries with an AIS score of 4–6. Among patients with multi-system trauma and TBI, 44.7% had spinal injuries that scored 4–6 on the AIS. Regression analysis predicted a serious spine injury (SI; AIS 3–6) with a prevalence of 10.6% and cervical spine injury (CSI; AIS 3–6) with a prevalence of 5.1%. Blunt trauma was a predictor for SI and CSI (OR 4.066 and OR 3.640, respectively; both p < 0.001) and fall > 3 m for SI (OR 2.243; p < 0.001) but not CSI (OR 0.636; p < 0.001). Pre-hospital shock was predictive for SI and CSI (OR 1.87 and OR 2.942, respectively; both p < 0.001), and diminished or absent motor response was also predictive for SI (OR 3.171) and CSI (OR 7.462; both p < 0.001). Patients over 65 years of age were more frequently affected by CSI.

Conclusions In addition to the clinical symptoms of pain, we identify ‘4S’ [spill (fall) > 3 m, seniority (age > 65 years), seriously injured, skull/traumatic brain injury] as an indication for increased attention for CSIs or indication for spinal motion restriction.

Keywords Immobilization · Prehospital · Risk · Trauma

Abbreviations

AIS Abbreviated Injury Scale
CSI Cervical spine injury
ECS Eppendorf–Cologne Scale
ISS Injury severity score

SCI Spinal cord injuries
TBI Traumatic brain injury

1 German Red Cross, Emergency Medical Service, Obere Wässere 1, 72764 Reutlingen, Germany
2 Center for Public Health and Health Services Research, University Hospital Tübingen, Tübingen, Germany
3 Institute for Research in Operative Medicine (IFOM), University Witten/Herdecke, Cologne, Germany
4 Department of Anesthesiology, Intensive Care Medicine, Emergency and Pain Medicine, Klinikum am Steinenberg, Reutlingen, Germany
5 Department of Trauma and Orthopedic Surgery, BG Trauma Center Ludwigshafen, Ludwigshafen, Germany
6 Committee on Emergency Medicine, Intensive Care and Trauma Management (Sektion NIS) of the German Trauma Society (DGU), Cologne, Germany