

ORIGINAL RESEARCH

Open Access



Possible advantages of early stabilization of spinal fractures in multiply injured patients with leading thoracic trauma - analysis based on the TraumaRegister DGU®

Sven Hager¹, Helge Eberbach², Rolf Lefering³, Thorsten O. Hammer², David Kubosch², Christoph Jäger⁴, Norbert P. Südkamp², Jörg Bayer^{2*}  and TraumaRegister DGU®⁵

Abstract

Background: Major trauma often comprises fractures of the thoracolumbar spine and these are often accompanied by relevant thoracic trauma. Major complications can be ascribed to substantial simultaneous trauma to the chest and concomitant immobilization due to spinal instability, pain or neurological dysfunction, impairing the respiratory system individually and together. Thus, we proposed that an early stabilization of thoracolumbar spine fractures will result in significant benefits regarding respiratory organ function, multiple organ failure and length of ICU / hospital stay.

Methods: Patients documented in the TraumaRegister DGU®, aged ≥ 16 years, $ISS \geq 16$, $AIS_{Thorax} \geq 3$ with a concomitant thoracic and / or lumbar spine injury severity ($AIS_{Spine} \geq 3$) were analyzed. Penetrating injuries and severe injuries to head, abdomen or extremities ($AIS \geq 3$) led to patient exclusion. Groups with fractures of the lumbar (LS) or thoracic spine (TS) were formed according to the severity of spinal trauma (AIS_{Spine}): $AIS_{LS} = 3$, $AIS_{LS} = 4-5$, $AIS_{TS} = 3$ and $AIS_{TS} = 4-5$, respectively.

Results: 1740 patients remained for analysis, with 1338 (76.9%) undergoing spinal surgery within their hospital stay. 976 (72.9%) had spine surgery within the first 72 h, 362 (27.1%) later on. Patients with injuries to the thoracic spine ($AIS_{TS} = 3$) or lumbar spine ($AIS_{LS} = 3$) significantly benefit from early surgical intervention concerning ventilation time ($AIS_{LS} = 3$ only), ARDS, multiple organ failure, sepsis rate ($AIS_{TS} = 3$ only), length of stay in the intensive care unit and length of hospital stay. In multiple injured patients with at least severe thoracic spine trauma ($AIS_{TS} \geq 4$) early surgery showed a significantly shorter ventilation time, decreased sepsis rate as well as shorter time spend in the ICU and in hospital.

Conclusions: Multiply injured patients with at least serious thoracic trauma ($AIS_{Thorax} \geq 3$) and accompanying spine trauma can significantly benefit from early spine stabilization within the first 72 h after hospital admission. Based on the presented data, primary spine surgery within 72 h for fracture stabilization in multiply injured patients with leading thoracic trauma, especially in patients suffering from fractures of the thoracic spine, seems to be beneficial.

Keywords: Spinal fracture, Thoracic trauma, Multiply injured patients, Lung failure, Multiple organ failure

* Correspondence: joerg.bayer@uniklinik-freiburg.de

²Department of Orthopedics and Trauma Surgery, Medical Center – Albert-Ludwigs-University of Freiburg, Faculty of Medicine, Hugstetter Str. 55, 79106 Freiburg, Germany

Full list of author information is available at the end of the article



© The Author(s). 2020 **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>. The Creative Commons Public Domain Dedication waiver (<http://creativecommons.org/publicdomain/zero/1.0/>) applies to the data made available in this article, unless otherwise stated in a credit line to the data.