

# Cervical Spinal Cord Injury Shows Markedly Lower than Predicted Mortality (>72 Hours After Multiple Trauma) From Sepsis and Multiple Organ Failure

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## Abstract

**Background:** Sepsis and multiple organ failure (MOF) remain one of the main causes of death after multiple trauma. Trauma- and infection-associated immune reactions play an important role in the pathomechanism of MOF, but the exact pathways remain unknown. Spinal cord injury (SCI) may lead to an altered immune response, and some studies suggest a prognostic advantage for such patients having sepsis or multiple trauma. Yet these findings need to be evaluated in larger cohorts of trauma patients. **Methods:** Retrospective, multicenter study, using the data of the TraumaRegister DGU. Patients with and without SCI surviving the initial first 72 hours after trauma were matched according to injury pattern and age. Comparative analysis considered morbidity (sepsis, MOF) and hospital mortality. **Results:** The study population included 800 matched pairs. As intended by the matching process, patients with cervical SCI had an otherwise comparable injury pattern but a higher severity of trauma (mean Injury Severity Score: 36 vs 29, mean number of diagnosis: 5.6 vs 4.4). They had a higher rate of sepsis (15.9% vs 10.9%,  $P = .005$ ) and MOF (35.9% vs 24.1%,  $P < .001$ ) while mortality revealed no significant difference (9.5% vs 9.9%,  $P = .866$ ). **Conclusions:** Cervical SCI leads to an increased rate of sepsis and MOF but appears to be favorable with respect to outcome of sepsis and MOF following multiple trauma. Further research should focus on the pathomechanisms and the possible arising therapeutic options.

## Keywords

spinal cord injury, multiple organ failure, MOF, SIRS, septic inflammatory response syndrome, SCI-associated immune deficiency syndrome

## Introduction

Sepsis is defined as a life-threatening organ dysfunction caused by a dysregulated host immune response to an infectious cause.<sup>1</sup> Multiple studies showed that sepsis is a main cause for hospital and intensive care unit (ICU) admission and hospital mortality.<sup>2,3</sup> Fleischmann et al showed that in Germany alone the incidence of sepsis rose to 335/100 000 cases per annum in 2013. Meanwhile, the mortality rate decreased from 27% to 24.3%.<sup>3</sup> Estimated costs for intensive care treatment are about €1.7 billion and indirect health costs and consecutive costs for the social systems rise to about €6.3 billion per year.<sup>4</sup>

Despite major research in the field, the pathophysiology of sepsis and trauma-induced multiple organ failure (MOF) is yet not precisely understood.

The changes in microcirculation and the abnormalities of coagulation may lead to multiple organ dysfunction syndrome (MODS). In an editorial published by Baue in 1975, MODS has been described for the first time.<sup>5</sup> After several adjustments, the

term MODS is currently used to describe a clinical syndrome characterized by the development of progressive and potentially reversible physiologic dysfunctions in 2 or more organs

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