

ORIGINAL RESEARCH

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# Nerve injury in severe trauma with upper extremity involvement: evaluation of 49,382 patients from the TraumaRegister DGU<sup>®</sup> between 2002 and 2015

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## Abstract

**Background:** Peripheral nerve injury (PNI) as an adjunct lesion in patients with upper extremity trauma has not been investigated in a Central European setting so far, despite of its devastating long-term consequences. This study evaluates a large multinational trauma registry for prevalence, mechanisms, injury severity and outcome characteristics of upper limb nerve lesions.

**Methods:** After formal approval the TraumaRegister DGU<sup>®</sup> (TR-DGU) was searched for severely injured cases with upper extremity involvement between 2002 and 2015. Patients were separated into two cohorts with regard to presence of an accompanying nerve injury. For all cases demographic data, trauma mechanism, concomitant lesions, severity of injury and outcome characteristics were obtained and group comparisons performed.

**Results:** About 3,3% of all trauma patients with upper limb affection (n = 49,382) revealed additional nerve injuries. PNI cases were more likely of male gender (78,6% vs. 73,2%) and tended to be significantly younger than their counterparts without nerve lesions (mean age 40,6 y vs. 47,2 y). Motorcycle accidents were the most frequently encountered single cause of injury in PNI patients (32,5%), whereas control cases primarily sustained their trauma from high or low falls (32,2%). Typical lesions recognized in PNI patients were fractures of the humerus (37,2%) or ulna (20,3%), vascular lacerations (arterial 10,9%; venous 2,4%) and extensive soft tissue damage (21,3%). Despite of similar average trauma severity in both groups patients with nerve affection had a longer primary hospital stay (30,6 d vs. 24,2 d) and required more subsequent inpatient rehabilitation (36,0% vs. 29,2%).

**Conclusion:** PNI complicating upper extremity trauma might be more commonly encountered in Central Europe than suggested by previous foreign studies. PNI typically affect males of young age who show significantly increased length of hospitalization and subsequent need for inpatient rehabilitation. Hence these lesions induce extraordinary high financial expenses besides their impact on health related quality of life for the individual patient. Further research is necessary to develop specific prevention strategies for this kind of trauma.

## Background

Extremity involvement is very commonly seen in multiply injured patients. A single-center evaluation of injury patterns revealed extremity trauma including the pelvic girdle in 53% of 1599 consecutive shock room trauma patients [1]. Data from the TraumaRegister DGU<sup>®</sup> showed a significant number of extremity lesions (AIS $\geq$ 2) in 58,6% of

24,885 patients with an ISS  $\geq$  16 [2]. The upper limbs generally seem to be affected in about 21,9% to 32,8% of trauma patients [2, 3]. There is a scarcity of studies within the medical literature which report on the frequency and context of additional nerve injury aggravating specifically upper extremity trauma. A comprehensive study of 5777 trauma victims between 1986 and 1996 performed by Noble and colleagues identified 162 patients with upper or lower extremity peripheral nerve injuries (PNI) which would be a fraction of 2,8% of all trauma patients [4]. A retrospective analysis of the MarketScan Commercial

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