

Article

# Which Risk Factors Predict Knee Ligament Injuries in Severely Injured Patients? – Results from an International Multicenter Analysis

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**Abstract:** *Introduction:* Ligament injuries around the knee joint and knee dislocations are rare but potentially complex injuries associated with high-energy trauma. Concomitant neurovascular injuries further affect their long-term clinical outcomes. In contrast to isolated ligamentous knee injuries, epidemiologic data and knowledge on predicting knee injuries in severely injured patients is still limited. *Methods:* The TraumaRegister DGU® (TR-DGU) was queried (01/2009–12/2016). Inclusion criteria for selection from the database: maximum abbreviated injury severity  $\geq 3$  points (MAIS 3+). Participating countries: Germany, Austria, and Switzerland. The two main groups included a “control” and a “knee injury” group. The injury severity score (ISS) and new ISS (NISS) were used for injury severity classification, and the abbreviated injury scale (AIS) was used to classify the severity of the knee injury. Logistic regression analysis was performed to evaluate various risk factors for knee injuries. *Results:* The study cohort included 139,462 severely injured trauma patients. We identified 4411 individuals (3.2%) with a ligament injury around the knee joint (“knee injury” group) and 1153 patients with a knee dislocation (0.8%). The risk for associated injuries of the peroneal nerve and popliteal artery were significantly increased in dislocated knees when compared to controls (peroneal nerve from 0.4% to 6.7%, popliteal artery from 0.3% to 6.9%, respectively). Among the predictors for knee injuries were specific mechanisms of injury: e.g., pedestrian struck (Odds ratio [OR] 3.2, 95% confidence interval [CI]: 2.69–3.74  $p \leq 0.001$ ), motorcycle (OR 3.0, 95% CI: 2.58–3.48,  $p \leq 0.001$ ), and motor vehicle accidents (OR 2.2, 95% CI: 1.86–2.51,  $p \leq 0.001$ ) and associated skeletal injuries, e.g., patella (OR 2.3, 95% CI: 1.99–2.62,  $p \leq 0.001$ ), tibia (OR 1.9, 95% CI: 1.75–2.05,  $p \leq 0.001$ ), and femur (OR 1.8, 95% CI: 1.64–1.89,  $p \leq 0.001$ ), but neither male sex nor general injury severity (ISS). *Conclusion:* Ligament injuries and knee dislocations are associated with high-risk mechanisms and concomitant skeletal injuries of the lower extremity, but are not predicted by general injury severity or sex. Despite comparable ISS, knee injuries prolong the hospital length of stay. Delayed or missed diagnosis of knee injuries can be prevented by comprehensive clinical evaluation after fracture fixation and a high index of suspicion is advised, especially in the presence of the above mentioned risk factors.