

## **An Analysis of Bilateral Femoral Shaft Fracture Outcomes Using a Retrospective Cohort From the NTDB**

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**Purpose:** Bilateral femoral shaft fractures are uncommon injuries and have been associated with increased morbidity and mortality relative to unilateral fractures. The current literature includes only small case series, many of which predate modern resuscitation and fixation standards. Our study aim was to document the effect of modernly treated bilateral femur fractures on outcomes using the National Trauma Data Bank (NTDB).

**Methods:** Patients in the NTDB between the years 2007-2015 who had operatively treated femoral shaft fractures were reviewed. Demographic and injury data were analyzed both collectively, and within subgroups according to age and ISS. Our primary outcome measures were complication rates, hospital length of stay, days in the ICU, days on a ventilator, and mortality rates.

**Results:** 119,213 patients met the inclusion criteria for this study, of whom 6892 (5.8%) sustained bilateral femoral shaft fractures. Relative to unilateral injuries, bilateral femur fractures demonstrated an increased number of overall complications (0.74 vs 0.50,  $P < 0.0001$ , confidence interval [CI] 1.234-1.276), longer length of stay (14.3 vs 9.2,  $P < 0.0001$ , CI 1.0081-1.0083), number of ICU days (5.3 vs 2.4,  $P < 0.0001$ , CI 1.0166-1.0171), and number of days on a ventilator (3.1 vs 1.3,  $P < 0.0001$ , CI 1.0127-1.0132). The overall in-hospital mortality rate was 2.4% for bilateral and 1.5% for unilateral fractures ( $P < 0.0001$ , CI 1.35-1.85). Bilateral femoral shaft fractures were independently associated with longer hospital and ICU stays, and days on a ventilator when matched by similar presenting ISS scores and age ( $P < 0.0001$ ). In all patients, delay in fracture fixation beyond 24 hours was associated with increased mortality ( $P < 0.0001$ ) with each additional day up to the first 3 days. Delay up to the first 6 days was associated with worse outcomes in all other primary measures ( $P < 0.0001$  to  $P = 0.0278$ ).

**Conclusion:** In addition to overall higher mortality rates, bilateral femoral shaft fractures independently increase the risk for complications, prolonged hospital and ICU stays, and number of days on a ventilator, relative to unilateral injuries, even after matching for age and ISS. Hospital metrics must be adjusted to properly account for the added severity of these injuries and select appropriate scoring systems to reflect the unique physiologic burden of bilateral injuries. Timely definitive fixation is critical in both unilateral and bilateral injuries, as delay is associated with worse primary outcomes and higher mortality rates.