

### Characteristics of Femoral Shaft Fractures That Predict Ipsilateral Femoral Neck Fractures

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**Purpose:** Femoral shaft fractures can be seen in conjunction with ipsilateral femoral neck fractures with reported rates as high as 9%. Given the difficulty in detection of the femoral neck component on radiographs and the severe consequences of misdiagnosis, several centers have devised diagnostic algorithms to optimally identify these injuries that include pelvis CT and MRI. However, no study has looked at the characteristics of femoral shaft fractures that are associated with ipsilateral femoral neck fractures. The purpose of this study is to ascertain whether characteristics of femoral shaft fractures can be used to predict the presence of an ipsilateral femoral neck fracture.

**Methods:** At 3 Level I trauma centers ipsilateral femoral neck and femoral shaft fractures were identified retrospectively from the electronic medical record by their CPT and ICD-10 codes over a 2.5-year period (January 2020 to June 2022). We generated a comparison group of isolated femoral shaft fractures based on patient demographics from these institutions over the same time period. Age, sex, laterality, mechanism, Gustilo classification, and ISS were all recorded, and the fractures were classified according to initial displacement, open versus closed injuries, Winquist and OTA/AO classifications.

**Results:** We compared 246 isolated femoral shaft fractures with 140 ipsilateral femoral neck and femoral shaft fractures. Univariate analysis demonstrated OTA/AO 32.A compared to 32.B was more likely to have ipsilateral femoral neck fractures ( $P = 0.003$ ), transisthmus fractures to be more commonly associated with ipsilateral femoral neck fractures ( $P < 0.0099$ ), and greater initial displacement of femoral shaft fractures was also associated with femoral neck fractures ( $P = 0.0117$ ). Using both univariate and multivariate analysis, motor vehicle accident was the most predictive mechanism of ipsilateral femoral neck fracture. Multivariate analysis found location of the femur fracture through the isthmus ( $P = 0.0142$ ), and OTA 32.A ( $P = 0.0165$ ) predicted femoral neck fractures.

**Conclusion:** Based on our results, predictors of femoral neck fractures with associated ipsilateral femoral shaft fractures include high-energy mechanisms, fractures through the femur isthmus, initial femur fracture displacement, and the OTA/AO classification 32.A. Physicians can use this information to help identify and treat these significant injuries.