Decreased Bone Density in Geriatric Patients Does Not Lead to Inferior Outcomes After Open Reduction and Internal Fixation of Tibial Plateau Fractures

Matthew Garner, MD*; Elizabeth Gausden, MD; Stephen Warner, MD, PhD; Andre Shaffer, MD; Dean Lorich, MD;*
Hospital for Special Surgery, New York, New York, USA

Purpose: Operative fixation of periarticular fractures in elderly patients with poor bone quality can be challenging. Studies suggest that these patients may experience a higher rate of implant failure and poorer clinical outcomes when compared to younger cohorts, which has led many surgeons to pursue nonoperative management when feasible. Fractures of the proximal tibia (OTA 41.A-C), however, often present with significant articular involvement and surgical intervention is necessary to restore joint alignment and congruity. The purpose of this study was to determine if geriatric patients with decreased bone density had worse outcomes after open reduction and internal fixation (ORIF) of tibial plateau fractures when compared to younger patients with greater bone stock.

Methods: A prospective clinical registry of operatively treated tibial plateau fractures by a single surgeon was queried. Procedures were performed between 2003 and 2013 and all patients had a minimum of 1-year clinical outcomes scores including visual analog scale (VAS), Knee Outcome Survey Activities of Daily Living Scale (KOSADLS), the Lower Extremity Functional Scale (LEFS), and Short Form (SF)-36. For patients with preoperative CT scans, Hounsfield unit (HU) measurements were calculated by two reviewers on a GE Picture Archiving and Communication System (PACS) by creating three regions of interest on consecutive axial slices within the metaphyseal region of the distal femur. Values were averaged to generate a mean HU measurement, which was compared to available bone mineral densities (BMDs) for the femoral neck and lumbar spine as determined by bone densitometry (DXA). Clinical outcomes and HU measurements were analyzed between geriatric (age 65 or older) and nongeriatric cohorts.

Results: 93 patients were included for study, including 28 geriatric patients with a mean age of 73 years (range, 65-85) and 65 nongeriatric patients, mean age 48 years (range, 20-64). Cohorts were similar with regard to Schatzker classification and medical comorbidities including diabetes, hypertension, a history of smoking or alcohol abuse, and peripheral vascular disease. The nongeriatric cohort did have a significantly greater body mass index (27 vs 24, $P = 0.03$). HU measurements demonstrated an almost perfect intraclass correlation (ICC = 0.97), a strong correlation with lumbar BMD ($r = 0.5$), and a very strong correlation with femoral neck BMD ($r = 0.7$). HU measurements for nongeriatric patients were significantly greater than geriatric patients (136.4 vs 101.1, $P < 0.005$), and there was no significant difference seen between the two cohorts with regard to 1-year clinical outcome scores (Table 1).

Conclusion: Although our cohort of geriatric patients demonstrated significantly decreased bone density when compared with a younger cohort, there was no significant difference observed in subjective 1-year clinical outcomes after ORIF of tibial plateau fractures. Clinicians can use this information to counsel patient with regard to expected results postoperatively. Further, presumed inferior bone quality should not deter treating surgeons from operating on elderly patients with tibial plateau fractures as they can have similar results at 1 year.

Table 1
One-year clinical outcomes comparing geriatric and nongeriatric patients treated operatively for tibial plateau fractures.

	Geriatric	Non-Geriatric	p-value
VAS	1.51	1.1	0.3851
KOS	79.9	83	0.3901
LEFS	69.7	78.21	0.0514
SF-36 PCS	45.8	48.9	0.1361
SF-36 MCS	51.2	54.8	0.0824

PCS = Physical Component Summary;
MCS = Mental Component Summary

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