

Bone Mineral Density is not a Predictor of Loss of Alignment Following Distal Radius Fracture Fixation

Minal Tapadia, JD, MD, MA¹, William Dahl, MD², Hillard Spencer, MD³ and Neil Harness, MD³

Kaiser Permanente Research

¹Department of Orthopaedic Surgery, University of California, Irvine, Irvine, CA; ²United Orthopaedic and Spine Center, Bridgeport, West Virginia;

³Department of Orthopaedic Surgery, Southern California Permanente Medical Group, Anaheim, CA

Purpose:

- To determine if low bone mineral density predicts loss of alignment following distal radius fracture fixation.
- We hypothesized that patients who have a lower dual energy x-ray absorptiometry score would have a tendency toward loss of alignment on postoperative imaging following distal radius fracture fixation.

Methods:

- A prospective cohort study was performed that included 116 Kaiser Permanente Southern California (KPSC) enrollees who were aged 55 years or older between January 1, 2007 and December 31, 2012 and underwent open reduction internal fixation of a distal radius fracture.
- Demographic data were recorded from the distal radius fracture operative registry, administrative databases and the medical record. There were 103 females (89%) and 13 males (11%).
- Patients over the age of 50 who sustain a distal radius fracture are typically evaluated with a dual energy absorption spectrometry (DXA) scan within 3 months of the injury at KPSC. Patients were stratified into three groups based on DXA score: normal (n = 21, 18%, T-score > -1), osteopenic (n = 67, 58%, T-score -2.5 to 1), or osteoporotic (n = 28, 24% T-score < -2.5). Those patients who lacked DXA scores were excluded from the study.
- Postoperative radiographs were classified using the AO classification for distal radius fractures.
- Radiographic parameters including palmar tilt, radial inclination and ulnar variance were measured on immediate postoperative films as well as on final 6-week postoperative films. In cases where immediate postoperative films were not available, 2-week postoperative films were used.
- For each group as well as for the group as a whole, the average immediate postoperative value for each radiographic parameter was compared to the average final value using paired t-tests (p<0.05).

Results:

- There were 103 operatively treated fractures in women and 13 fractures in men. The mean age was 71 years (range, 55-96). The mean T-score was -1.93.
- There were 47 AO type A fractures, 13 type B fractures, and 56 type C fractures.
- In multivariable analysis, controlling for age, sex, and AO classification, the group as a whole exhibited no significant changes in radiographic parameters (radial inclination, 0.078 ± 0.57 degrees; ulnar variance, -0.03 ± 0.15 mm; and palmar tilt 0.09 ± 0.20 degrees) between immediate postoperative and final postoperative films.
- In univariate analysis, the presence of osteoporosis or osteopenia had no significant effect on loss of alignment, and for each bone mineral density group there were no significant differences in each radiographic parameter.

Table 1 – Change in radial inclination

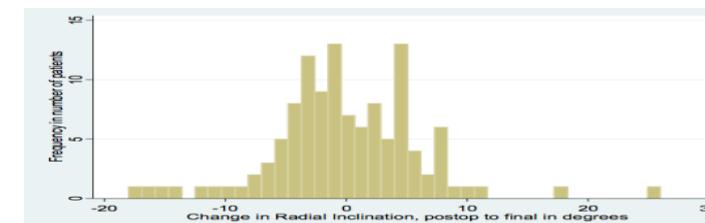


Table 2 - Change in ulnar variance

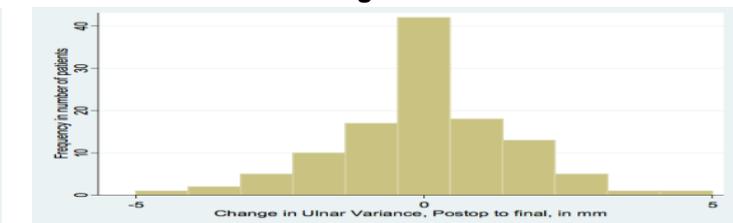
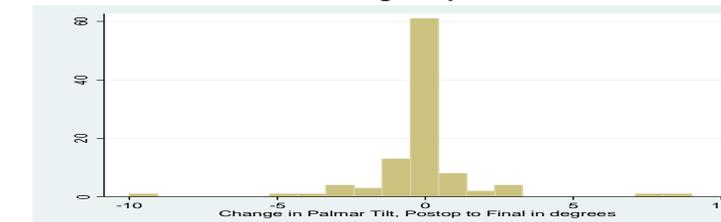


Table 3 – Change in palmar tilt



Conclusions:

- Low BMD does not exhibit a significant correlation with loss of reduction following internal fixation of distal radius fractures.
- Other factors such as bone geometry or trabecular structure and also surgical technique may be more responsible for loss of alignment after surgery than bone density alone.