Distal Radius Fractures: Does the Anesthesia Method Have an Impact on the Post-Reduction Radiographic Measurements? A Comparison Between Hematoma and Bier Block

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Purpose: Displaced distal radius fractures are commonly treated with closed reduction and splinting in the acute care setting and there is no established better anesthesia method regarding quality of the reduction. We hypothesize that radiographic outcomes after closed reduction and splinting of distal radius fractures in the emergency department are dependent on whether regional (Bier block) or local (hematoma block) anesthesia is used.

Methods: In an IRB-approved retrospective study, consecutive adult patients undergoing closed reduction and splinting of a dorsally displaced distal radius fracture in the emergency department at two academic tertiary care institutions between 2014 and 2017 were identified. Patients with previous fracture, OTA B fracture, and reduction performed by non-orthopaedic residents were excluded. Demographic variables, pre- and post-reduction measurements on radiographs (radial height [RH], radial inclination [RI], ulnar variance [UV] and lateral tilt [tilt]), time of procedure, level of training, and OTA classification were collected. Student's t test, $\chi 2$, or Fisher's exact test were used when appropriated. *P* value <0.05 was considered statistically significant.

Results: 83 patients underwent reduction under hematoma block (HB), and 95 patients under Bier block (BB). Both groups were similar in comorbidities, gender, and OTA classification, but HB patients were significantly older than in the BB (60 vs 54 years old, $P = 0.02$). Pre-reduction RH, RI, and tilt were not significantly different between the two groups, but initial UV was less positive in the BB group (1 mm vs 3 mm, $P<0.001$). Post-reduction measurements were significantly different for tilt, with a mean of 3° volar in BB compared to neutral in HB ($P = 0.03$) and UV, with a mean neutral variance in the BB compared to 1 mm in HB ($P<0.001$). Absolute correction (difference between pre and post-reduction measurements) for tilt and UV were similar while RI and RH had significantly bigger values for the HB group. Absolute tilt correction was smaller among the obese patients (21° vs 28°, $P = 0.002$), and post-reduction tilt was also different according to the obesity status (1 dorsal vs 2.5 volar, in degrees, obese vs non-obese, respectively, $P = 0.04$).

Conclusion: Total correction under both anesthesia methods was radiographically similar for tilt and UV. A significantly more volar tilt post-reduction was achieved in the BB, although the clinical impact may not be significant since neutral position was achieved in HB. Obesity was associated with significant differences in radiographic outcomes. While each type of anesthesia has its own set of risks, radiographic parameters following distal radius fracture closed reduction in adult patients may be significantly different depending on the type of anesthesia used and the obesity status.