

Does Motion at 8 Weeks Predict Nonunion in Nonoperatively Managed Humeral Shaft Fractures? A Prospective Multicenter Evaluation

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Purpose: An important factor to patients in deciding on operative versus nonoperative management for humeral shaft fractures is how long it will take to know if they will unite if treated nonoperatively. We prospectively evaluated gross motion at the fracture site at 8 weeks as a potential indicator of future nonunion in humeral shaft fractures with the hypothesis that a lack of gross motion of the fracture at 8 weeks would predict union in patients treated nonoperatively.

Methods: As part of a comparative study, we screened all patients with an acute humeral shaft fractures at 13 centers. We are reporting on those treated nonoperatively with a functional brace. Follow-up was at 4, 8, 12, 26, and 52 weeks. At each visit the fracture was examined for gross motion, visual analog scale (VAS) pain, and callus presence or not on all 4 cortices. We evaluated those with versus those without gross motion at 8 weeks.

Results: We prospectively enrolled 101 (52% M) patients aged 18-71 years (mean 41) with humeral shaft fractures (OTA 12A-C). 4 patients chose operative treatment prior to 8-week follow-up, 7 did not have a documented examination of motion, and 14 were lost to follow-up at <8 weeks, leaving 80 patients. Neither the body mass index (29 vs 31) nor the ISS (6.8 vs 6.9) were different for those with and without motion. 62 (77%) had no motion and 18 (23%) had gross motion at the fracture site at 8 weeks. 58 patients who had no gross motion went on to union (the other 4 were lost to follow-up). Of the 18 patients who had gross motion at 8 weeks, 2 were lost to follow-up, 7 (44%) healed, and 9 (56%) went on to surgery. The VAS score at 8 weeks for those who had gross motion and united was not different than those who did not ($P = 0.7$). Callus was present on 3 of 4 cortices in 6 of the 7 who went on to union and only 3 of the 9 who went on to surgery ($P = 0.06$). Excluding those lost after 8 weeks, the positive predictive value (PPV) and negative predictive value (NPV) for a lack of gross motion resulting in union without surgery was 100% and 56% (9 of 16 went on to surgery).

Conclusion: These data strongly suggest that a lack of motion at 8 weeks predicts union and that patients with gross motion with a lack of callus formation may benefit from surgical intervention.