

The Association of Ipsilateral Rib Fracture(s) with Displacement of Midshaft Clavicle Fractures

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Background/Purpose: Recent evidence suggests that operative fixation of displaced midshaft clavicle fractures (OTA 15-B) significantly decreases nonunion rates as well as improves functional results compared to nonoperative management. Close radiographic follow-up in trauma patients with high-energy clavicle fractures is also recommended due to a high prevalence of subsequent displacement. To our knowledge, there is currently no evidence to indicate which clavicle fractures are more likely to displace in the weeks following the trauma. The purpose of this study is to determine if the presence of ipsilateral rib fracture(s) affects the rate of a clavicle fracture being unstable (>100% displacement). We hypothesized that the presence of ipsilateral rib fracture(s) would lead to an increased rate of unstable midshaft clavicle fractures when compared to those without ipsilateral rib fracture(s).

Methods: A retrospective review from 2002-2013 was performed at a single Level I trauma center evaluating 243 midshaft clavicle fractures. These fractures were then subdivided into those with ipsilateral rib fracture(s) (CIR; n = 149), and those without ipsilateral rib fracture(s) (CnIR; n = 94). The amount of displacement was measured on the initial injury radiograph as well as subsequent follow-up radiographs taken during the first 2 weeks after injury. Fractures were subsequently classified as "stable" (<100% displacement) or "unstable" (>100% displacement). Ipsilateral rib fracture(s) were also assessed and recorded based on which number rib was fractured as well as the total number of ribs that were fractured.

Results: 116 (78%) of the midshaft clavicle fractures with ipsilateral rib fracture(s) (CIR) and 51 (54%) of the midshaft clavicle fractures without ipsilateral rib fracture(s) (CnIR) were found to be unstable ($P = 0.0047$). 72% of the CIR group, compared to only 40% of the CnIR group, progressed from stable to unstable clavicle fractures ($P < 0.001$). Each additional rib fracture was found to increase the odds of final displacement greater than 100% by a factor of 1.24 (95% confidence interval [CI], 1.11-1.38). The odds ratio for progression to an unstable clavicle fracture was found to be 4.08 ($P = 0.000194$) when ribs 1-4 were fractured and not significant for rib fractures 5-8 or 9-12.

Conclusion: The presence of concomitant ipsilateral rib fracture(s) significantly increases the rate of unstable midshaft clavicle fractures. Additionally, a fracture involving the upper one-third of the ribs (ie, ribs 1-4) will significantly increase the rate of the clavicle fracture being unstable. Also, there is a trend for clavicle fractures with associated ipsilateral rib fracture(s) to demonstrate an increased amount of displacement on follow-up radiographs compared to those without ipsilateral rib fracture(s).

- The FDA has not cleared this drug and/or medical device for the use described in this presentation (i.e., the drug or medical device is being discussed for an "off label" use). For full information, refer to page 600.