

Weight Bearing After Surgical Fixation of Clavicle Fractures in Polytraumatized Patients: A Retrospective Cohort Study

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INTRODUCTION:

In the setting of a polytraumatized patient with concurrent lower extremity injuries, it is imperative to allow early upper extremity weight-bearing to allow for mobilization with the use of crutches or walker to expedite rehabilitation. Patients with isolated clavicle fractures that are treated surgically are generally treated with a period of limited or non-weight bearing and sling immobilization, followed by range of motion progression, and eventual strengthening and advancement to full weight-bearing around the 6-week post-operative mark. Previous literature has shown if fixed appropriately, patients with humeral shaft and fractures can weight-bear without increased failures. However, there is limited research to guide appropriate post-operative weight-bearing precautions for clavicle fracture if the patient requires the use of their upper extremities to mobilize. The goal of this study is to compare two cohorts, patients who were allowed to weight bear immediately and those who were nonweight bearing after clavicle fracture fixation and determine if there was a difference in complications between these groups.

METHODS:

Our study was approved by our Intuitional Review Board. After study approval from the IRB, ICD code for clavicle open reduction internal fixation (ORIF) was used to obtain sequential charts were pulled from the electronic records from January 1st, 2014 through June 1st, 2021. Records from three-level one trauma centers were included. Charts were then individually reviewed to generate a cohort of polytraumatized patients with concomitant lower extremity or pelvic fractures. Each case was scrutinized based on the operative report, progress and physical therapy notes to ensure that patients were actively weight-bearing as tolerated (WBAT) through the utilization of a walker or crutches. Inclusion criteria also included age greater than 18 years of age, fracture of the middle shaft of the clavicle with the distal end proximal to the coracoid process, and clinical/radiographic follow-up at 6 weeks postoperatively. Six week follow up was chosen to assess failure of fixation because at this time point most patients would be advanced to full weight-bearing. A one-to-one matched cohort of patients who were non-weight bearing (NWB) was then created based on age, sex, and temporality of ORIF. Data was collected including patient demographics, fracture type, fixation method. Outcomes measured included post-operative complications, specifically, acute hardware failure (HWF) with or without the requirement of revision, and surgical site infections.

RESULTS:

Seven hundred and sixty-four charts were individually reviewed and exclusion and matching, we had a cohort of 39 WBAT and a matched 39 NWB. Demographics were balanced after matching with no statistically significant differences in the cohorts. Patients were on average 44 ± 17 years old, and each group consisted of 28 males (72%). The NWB group had a longer time period (8.2 ± 7.4 days) between injury and definitive fixation when compared to the WBAT group (2.7 ± 3.8 days) ($p < 0.001$). During the first 6 weeks, in the WBAT group, there was 1 HWF requiring surgical intervention. In the NWB group, there was 1 HWF that required intervention and 1 that was treated without surgery and eventually went on to asymptomatic malunion. There was no significant difference between the two groups for HWF requiring surgical intervention ($p = 0.75$) and HWF overall ($p = 0.49$). Lastly, 5% ($n=2$) of the NWB developed a superficial surgical site infection (SSI) that required antibiotics with none in the WBAT group.

DISCUSSION AND CONCLUSION:

Our data would support that in the polytraumatized patient, a protocol of immediate weight-bearing after clavicle ORIF does not lead to an increase in hardware failure or re-fracture and would provide evidence for further investigation and modification of the current dogma of protracted post-operative weight-bearing restrictions. The strength of our study design was that our cohort of WBAT all had co-occurring injuries that necessitated the need for assistive devices including crutches and walkers. Therefore, we were sure that the patients put true loads through their surgical extremity post operatively. We found no significant difference in HWF requiring surgical revision and HWF rates overall comparing WBAT to NWB. We chose to evaluate patients up to 6 weeks given that most orthopedic surgeons would allow for full weight-bearing after that milestone, so if the construct has remained intact, then the WBAT and NWB groups would converge and become equivalent in their treatment and likely their long term clinical and radiographic outcome. To the author's knowledge, this would be the largest retrospective cohort that had post-hospitalization follow up to determine the impact of weight-bearing through the standard post-operative monitoring course. Regarding the SSI, this is likely secondary to sampling error and further investigation would need to be performed to determine if any statistical significant difference exists. Furthermore, in the NWB group, there was an increased proportion of elective procedures which likely

delayed time to fixation rather than arriving as a polytrauma. Given these findings, we suspect that patients with isolated clavicle fractures would be able to WBAT immediately post-operatively without an increased risk of hardware failure. Allowing patients to begin weight-bearing immediately may lead to quicker return to function. However, further research would need to be performed to verify these conclusions.