

Community Distress as a Risk Factor for Tibial Shaft Nonunion following Intramedullary Nail Fixation

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INTRODUCTION:

There is strong evidence of the prevalence of healthcare disparities within orthopaedic trauma patients. However, how these healthcare disparities may affect clinical outcomes is understudied. Tibial shaft fractures, even those appropriately treated with intramedullary nail fixation (IMN), are particularly prone to nonunion; however, the association of healthcare disparities with this complication is unknown. One measure of disparities is the distressed community index (DCI). The objective of this study was to determine if community distress is a risk factor for developing tibial shaft nonunion following IMN fixation.

METHODS:

A retrospective chart review of patients who underwent tibial shaft fracture fixation with IMN was designed at a Level 1 Trauma Center. Inclusion criteria included patients greater than age 18 with AO/OTA 42A-C tibial shaft fractures treated with an intramedullary nail implant. Patient characteristics including age, sex, BMI, smoking status, and comorbidities were collected. Zip codes were collected, which were used to determine patients' DCI scores. Scores above 80 indicated that a community was distressed. Additionally, we controlled for confounding factors such as quality of reduction, severity of injury, open vs. closed fractures, and patient comorbidities. Predictive chi-squared analyses were utilized to determine the association of patients with DCI above 80 and tibial shaft nonunion.

RESULTS:

There was a total of 103 patients (Average age: 44.8, BMI: 29.1, 47.6% female, 50.5% with smoking history, average follow-up length 6.0 months). Fifteen patients (14.6%) were considered to reside in a distressed community (DCI score above 80). Of the patients in distressed communities, the average BMI was 28.2, 2 (13.3%) had diabetes, 9 (60%) had a smoking history, 3 (20%) had vascular disease, and 2 (13.3%) had renal disease. There were no significant differences in fracture severity and quality of reduction between the two cohorts.

Patients from distressed communities were more likely to experience nonunion (4/15 patients (26.7%) vs. 4/88 (4.5%) from other communities; $p < 0.05$). Six of these patients underwent revision surgeries with optimal healing, except for one patient from a distressed community who had a subsequent fracture-related infection.

DISCUSSION AND CONCLUSION:

In this study, we found that patients from distressed communities with tibial shaft fractures were more likely to experience nonunion. The findings from this study indicated that there may be socioeconomic and sociocultural factors from distressed communities that place patients from these communities at a statistically significant increased risk of developing tibial shaft nonunions, even after appropriate treatment. Recognizing this phenomenon and further research into the underlying factors may help address the social determinants of health and help to guide clinical decision making to optimize patient outcomes.