

The Effect of Metabolic and Endocrine Disturbances on Fracture Nonunion*Bopha Chrea, MD¹; Clay Spittler, MD; Matt L. Graves, MD; Daniel Miles, BS¹;**Josie M. Hydrick, BS¹; Patrick F. Bergin, MD**¹University of Mississippi Medical Center, Jackson, Mississippi, USA*

Purpose: Fracture nonunion leads to decreased quality of life for patients and high financial costs to the patient and the health-care system. Both mechanical and metabolic factors play an important role in fracture healing. Previous reports document high rates of metabolic disturbance in nonunions that have otherwise received appropriate surgical/nonsurgical treatment. The goal of this study is to define the rate of metabolic disturbance in all long bone nonunions treated at a single Level I trauma center over a period of 6 years. We hypothesize that the rate of metabolic disturbance in patients with nonunion will not differ based on adequacy of initial treatment.

Methods: A retrospective chart review was performed of billing and coding records identifying patients who underwent operative intervention for nonunion from January 2010-December 2016. Exclusion criteria included age <18 years, treatment by non-trauma faculty, and planned, staged bone grafting of segmental defects. 111 out of 166 patients identified from billing records met inclusion criteria. These 111 patients were placed into 2 groups based on the adequacy of the initial treatment. Data analysis included demographics, nonunion site, assessment of initial fracture treatment quality, and metabolic/endocrine laboratory values (calcium, thyroid-stimulating hormone, free T4, Vitamin D, magnesium, phosphorus, testosterone, and alkaline phosphatase).

Results: In our nonunion cohort of 111 patients, 78% of patients had an undiagnosed metabolic or inflammatory laboratory abnormality. There was no statistically significant difference among fracture nonunions with adequate mechanical stability versus inadequate stability ($P = 0.6$). Among the patients deemed to have inadequate mechanical stabilization a total of 76% of patients (16 of 21) demonstrated an undiagnosed abnormality in their testing versus 79% of patients (71 of 90) in the patients deemed to have adequate mechanical stability. As a result of testing, 59% of patients had their treatment plans changed.

Conclusion: These data demonstrate a relatively high rate of metabolic disturbance in patients with long bone nonunions. Furthermore, we found no significant differences between rates of metabolic disturbance based on adequacy of initial treatment. We recommend metabolic screening for all patients with fracture nonunions, not simply those without mechanical reason for nonunion.