

### **Introduction**

Tibiotalarcalcaneal (TTC) fusion is a procedure in which the tibiotalar and talocalcaneal joints are arthrodesed in order to address arthritis and deformity of the ankle and hindfoot. The surgery is generally done as a salvage procedure to treat painful and dysfunctional ankle/hindfoot conditions that have been recalcitrant to other surgical or conservative interventions. TTC fusions are associated with inherent challenges in both the perioperative and postoperative time frames, as patients generally present with a number of risk factors for poor healing and often have significant preoperative deformity. The goal of this project is to review the complications of TTC fusions done by the UVA foot and ankle division relative to several patient variables in order to identify factors related to patient outcomes. The hope is that by identifying these patient-specific factors, perioperative interventions might be undertaken to improve outcomes, and preoperative discussions with patients regarding surgical expectations and risks might be enriched.

### **Materials and Methods**

IRB approval was obtained according to the University of Virginia policies for human research. A retrospective chart review of all patients who underwent TTC fusion between January 2010 and January 2016 by the surgeons in the UVA foot and ankle division was undertaken. In all of these cases, patients underwent tibiotalar and talocalcaneal arthrodesis with intermedullary fixation using the Phenox nail (Biomet) and either iliac crest autograft or bone marrow aspirate. Patients between the ages of 18 and 80 years were included, and gender was nondiscriminatory. Exclusion criteria included patients who had follow-up visits recorded for less than 3 months. Patient variables analyzed included age, BMI, smoking status, arthritis etiology (traumatic vs. atraumatic), presence of peripheral vascular disease, and preoperative hindfoot deformity. Data was collected from the UVA EMR and complications were identified as post-operative outcomes requiring additional intervention, including additional surgery or bracing for non-union, post-operative infection, or hardware failure. Two perioperative mortalities were also identified and were included in the complication group.

### **Results and Discussion**

Thirty-five patients were identified as meeting the inclusion criteria for our study. Sixty percent were female and the average age was 58 years (range 23 – 79 years). The average length of follow-up was 592 days (range 84 to 1499 days). Eleven complications were identified, including two perioperative mortalities, two non-unions with intact nails, three non-unions with nail failure, two tibial stress fractures, and two wound infections requiring irrigation and debridement. In comparing complication frequency to patient comorbid variables, presence of

peripheral vascular disease had the most significant increase in complication rate with 100% of patients carrying the diagnosis of PVD having complications (3 out of 3) and 25% of patients without PVD who had complications (8 out of 32). This was followed by the complication risk of having diabetes with 50% (6 out of 12) of patients with diabetes having complications and 22% (5 out of 23) of patients without diabetes having complications. Preoperative hindfoot alignment also seemed to affect the complication frequency with patients having either a valgus hindfoot of greater than 10 degrees or any degree of varus hindfoot having a 38% (9 out of 24) complication rate, and patient with neither hindfoot malalignment having a 13% (1 out of 8) complication rate.

### **Conclusions and Future Directions**

Results of this study shed light on the various complications that arise in TTC fusions, and perhaps more importantly on what patient factors can contribute to the complication rate. Preliminary results suggest that peripheral vascular disease and diabetes present larger perioperative risk to complications than do other factors such as BMI, history of trauma, or smoking status. Future goals of this project include a statistical evaluation of the data to determine significance of the trends, and extension of this study design to other fusion and fixation models of the foot and ankle division. Results are expected to aid physicians in counseling their patients on treatment decisions for the difficult diagnosis of severe ankle and hindfoot arthritis.