BACKGROUND:
Several fixation techniques have been described for arthrodesis of the first metatarsophalangeal (MTP) joint. Dorsal plate fixation has been used commonly because of its superior strength and sagittal plane rigidity. Modern dorsal locking plates have been used recently due to relative ease of application and theoretically superior mechanical properties. Clinical results using these implants have not yet been reported. The purpose of the present study is to compare the radiographic and clinical outcomes of patients undergoing hallux MTP joint arthrodesis using a compression screw and one of two dorsal plate constructs for internal fixation: a low-profile precontoured dorsal titanium locked plate (Group 1), or a non-locked dorsal, pre-contoured stainless steel plate (Group 2).

METHODS:
We evaluated patients who underwent MTP joint arthrodesis with a compression screw and either a precontoured locked titanium dorsal plate (Group 1), or a non-locked stainless steel plate (group 2). Diagnoses included hallux valgus, hallux varus, hallux rigidus, rheumatoid arthritis (RA), and revision procedures. Post-operative evaluation included weight bearing radiographs, physical examination, and a patient survey. Clinical outcome measures included radiographic union, visual analog pain scale (VAS, range, 0-100), American Orthopaedic Foot and Ankle Society (AOFAS) hallux score, and a patient satisfaction survey. Groups were compared using fishers exact test or ANOVA, with significance set at p<0.05.

RESULTS:
Patients underwent clinical and radiographic follow-up at a minimum of six months post-op. There were 73 patients in group 1, and 107 patients in group 2. There was a higher nonunion rate in the locked plate group (group 1, 21.9%) compared to the non-locked plate group (group 2, 12.1%) though it did not reach statistical significance (p=0.062). There was no difference in union rates between groups in patients with RA (p=0.611), or in patients greater than 60 years of age (p=0.89). However, in non-RA patients, there were significantly more nonunions in group 1 compared to group 2 (22.2% vs. 6.94%; p=0.01). There was no difference between groups in overall complication rate, patient satisfaction, AOFAS scores, VAS score improvement, or improved shoe wear. There was a significantly higher nonunion rate and a higher complication rate in patients with RA in both groups (p<0.05).

CONCLUSIONS:
We found a trend toward an increased nonunion rate in patients undergoing hallux MTP arthrodesis with dorsal locked plating compared to those treated with traditional stainless steel non-locked plating. Nonunion rates were higher in RA patients in both groups. However, nonunion rates were no different between groups in patients over 60 years of age, who presumably have relatively poor bone quality. Possible explanations for the lower union rate with locked plating include a diminished ability to obtain sufficient interfragmentary compression with the locked plate design and the inferior rigidity of titanium plates compared to stainless steel. Improved plate design and patient selection may optimize outcomes.
in these procedures. Patients with RA should be counseled about their increased risk of complications and lower rate of union regardless of fixation method.

Keywords: Hallux MTP arthrodesis; Hallux valgus; Hallux rigidus; locked plating