INTRODUCTION: Supramalleolar osteotomy (SMO) using the Taylor Spatial Frame (TSF) for deformity correction is a rarely reported treatment method for adult foot and ankle deformities. SMO using the Taylor Spatial Frame offers certain advantages over more conventional surgical techniques, allowing for simultaneous correction of complex oblique plane and rotational deformities, postoperative adjustment of residual deformity, and avoidance of internal hardware implantation and open incisions.

We present a retrospective review of 52 patients who underwent supramalleolar osteotomy with application of the TSF for correction of coronal, sagittal, rotational, and oblique plane deformities of the ankle. The purpose of this study was to assess the efficacy of SMO with TSF for correction of malalignment as well as for pain relief and improved functional status. The primary outcome was the degree of correction of preoperative to postoperative anterior and lateral distal tibial angles. The secondary outcome was preoperative to postoperative change in AOFAS scores.

METHODS: Institutional Review Board approval and informed consent was obtained for performance of this retrospective analysis. The mean age was 44 years (range 18-79), with 23 males and 29 females. 22 patients had oblique plane deformities, and thus underwent simultaneous surgical correction in both the sagittal and coronal planes. 10 patients had simultaneous correction of both sagittal/coronal plane and rotational deformities. Thus, a total of 84 deformities were corrected in 52 patients.

All patients had concomitant pain, and 33 had arthritic changes around the ankle joint. Average duration of symptoms was 7 years, and patients had an average of 2 previous surgical procedures on the affected ankle (range 0-9). The mean time in frame was 4 months (range 2-11), and patients were followed for a mean of 13 months status-post frame removal. Adjuvant procedures were performed in a number of cases, including ankle distraction (31), bone marrow aspiration and insertion into the ankle joint (8), and tibial nerve release (2). 17 patients underwent simultaneous lengthening of the affected limb, and 3 patients underwent double level osteotomy.

Radiographic analysis with measurement of the anterior distal tibial angle (ADTA) and the lateral distal tibial angle (LDTA) was performed on all 52 patients preoperatively and at last follow-up visit. Preoperative and postoperative AOFAS scores were calculated for 31 patients. Statistical analysis was performed using paired t-tests to evaluate the difference between preoperative and postoperative radiographic angles and AOFAS scores.

RESULTS: Preoperative and postoperative distal tibial angles changed significantly within each deformity group. In the procurvatum group (n=12), mean preoperative ADTA was 95 and postoperative ADTA was 80 (p < .001). In the recurvatum group (n=13), mean preoperative ADTA was 63 and postoperative ADTA was 79 (p < .001). In the valgus group (n=16), mean preoperative LDTA was 79 and postoperative LDTA was 91 (p < .001). In the varus group (n=28), mean preoperative LDTA was 101 and postoperative LDTA was 90 (p < .001). All rotational deformities (n=15) were adequately corrected based on postoperative clinical assessment.

Average preoperative AOFAS score was 40 (range 12-67; SD 15.00) and average postoperative AOFAS score was 71 (range 34-97; SD 15.56). The change in AOFAS scores was significant (p < .001). 27 patients experienced cutaneous pin/wire site infections. 6 patients experienced deep tissue infections.

DISCUSSION: We feel that supramalleolar osteotomy using the Taylor Spatial Frame is an effective method for correction of foot and ankle deformities in the adult population. The method is particularly beneficial for the treatment of complex oblique plane deformities, in patients who have a compromised soft tissue envelope, a prior history of infection, or as an alternative to ankle arthrodesis.