Arthrodesis of the midfoot is a common surgical procedure for multiple arthritic pathologies. The rate of non-union presents a challenge to foot and ankle surgeons. If a non-union occurs and is symptomatic, revision arthrodesis may be indicated. In this novel procedure of trephine arthrodesis for symptomatic nonunion of the 2nd TMTJ, the patient went onto union shown by both serial plain film radiographs and MRI 6 months post-operatively. The arthrodesis may be fixed with hardware; however, union rates have been comparable without fixation. Autograft or allograft may be used based on surgeon preference.

One contra-indication for trephine arthrodesis is deformity at the joint undergoing arthrodesis. Due to the resection of joint and leaving the surrounding soft tissue structures and ligaments intact, reduction is not obtained.

### LITERATURE REVIEW

Primary osteoarthritis, secondary traumatic arthritis and inflammatory arthritis are all causes of midfoot arthritis. The tarsometatarsal joint (TMTJ) may also remain symptomatic after failed osteoarthrosis. Multiple surgical techniques have been described for the treatment of midfoot arthritis, including trephine arthrodesis.

The trephine arthrodesis was first described in spinal literature by Michie, et al. in 1949. Trephine arthrodesis has since been adopted into foot and ankle surgery. Johnson and Johnson described trephine arthrodesis of the midfoot in 1986. These authors performed a dowel arthrodesis using iliac crest autograft on fifteen patients who had a fracture/dislocation of the Lisfranc Joint. Their study resulted in osseous union for 10/13 patients. In 2006, Filiatrault and Banks performed a retrospective analysis on 15 patients with 22 joints fused using trephine arthrodesis (TMTJ, naviculocuneiform joint, subtalur joint). Union was achieved in 21 of the 22 joints (95%).

Trephine arthrodesis has shown good results without fixation. Ljung et al reported on 17 trephine arthrodesis cases without fixation, all at the talonavicular joint. All 17 cases went on to osseous union based on plain film radiograph. However, these studies were performed at least 2 decades ago where fixation indications and principles may have been different.

Nonunion of the midfoot during arthrodesis is a well-known and difficult complication. The most recent study by Dang et al reviewed 132 midfoot joints that underwent arthrodesis with joint resection (non-trephine) and dorsal locking plate fixation. This study resulted in 81.5% union rate, which is consistent within the current literature.

Both autograft and allograft have been used for midfoot trephine arthrodesis. Witherby et al discussed a surgical technique for TMTJ arthrodesis with a calcaneal bone autograft. Although this was a surgical technique, they stated there was no current concern for donor site morbidity. Filiatrault and Banks used a tibia or calcaneus autograft for their first 3 patients but transitioned to fresh frozen allograft for 16 patients. They achieved fusion at 15/16 joints with the allograft, and discussed that autograft was not required for union.

### ANALYSIS AND DISCUSSION

Trephine arthrodesis may be considered for revision of midfoot nonunion. Review of literature found no report of the trephine arthrodesis without hardware fixation for revision after symptomatic and painful nonunion. The procedure is reproducible with readily available materials at a relatively low cost, while also eliminating the need of orthopedic implants, which may lower operative time and chance of additional procedures. Future, prospective comparative studies of different joint resection techniques would be beneficial for evaluation of union at the midfoot.

### REFERENCES