A Prospective Randomized Controlled Trial of Autologous Fat Grafting for Pedal Fat Pad Atrophy

Isaac B James, MD; Beth R Gusenoff, DPM; Sheri S Wang, BS; Ryan T Mitchell, MD; Dane Wukich, MD; Jeffrey A Gusenoff, MD

Disclosure/Financial Support: Supported by a PSF Pilot Research Grant (awarded to Dr. Jeffrey A Gusenoff). None of the authors has a financial interest in any of the products, devices, or drugs mentioned in this manuscript.

INTRODUCTION: Pedal fat pad atrophy is associated with pain, decreased tissue thickness, and elevated foot pressures. To date, no objective studies have investigated the utility of injecting fat into the forefoot to treat this costly and debilitating form of lipoatrophy. We hypothesize that pedal fat grafting can reduce pain, improve function, increase tissue thickness, and decrease pedal pressures.

MATERIALS AND METHODS: A randomized, controlled trial was performed, assessing tissue thickness, pain, and foot pressures after fat grafting to the forefoot. Patients were randomized to receive either fat grafting or conservative management. Ultrasound-assessed tissue thickness, pedobarograph-assessed foot pressures, and the Manchester Foot Pain and Disability Index (MFPDI)[1] were obtained at baseline, 6mo, and 12mo visits. 18 patients (4 Male, 14 Female) comprised the treatment group, and 12 patients (4 Male, 8 Female) comprised the control group.

RESULTS: Average age was 60±8.7 years for the treatment group and 65.3±8.5 for the control. Mean BMI was 26.8±4.7 and 25.6±6.1 in treatment and control groups respectively. 11 patients received bilateral injections with a mean volume of 4.8±0.8mL and 4.7±0.7mL in the right and left feet respectively. Mean follow-up time was 8.7±6.2 months for the treatment group and 13.8±4.2 months for controls ($p=0.001$). At 1 year, grafted subjects demonstrated improvements in foot function ($p=0.022$), pain ($p=0.022$), and work/leisure activities ($p=0.021$) with a significant increase in tissue thickness over the metatarsal heads ($p<0.04$) at 6mo but not at 12mo. However, controls experienced significant decreases in average metatarsal tissue thickness over the first 6mo ($p<0.05$), and in the thickness over the 3rd metatarsal at 12mo ($p=0.036$), with most of the worsening occurring between the 6mo and 12mo time point ($p=0.023$). Foot pressures did not decrease after grafting. However, controls experienced increasing left foot pressure ($P=0.011$). When comparing the groups at 1 year, controls had significantly greater foot pressures and forces than patients receiving fat grafting ($p<0.05$).

CONCLUSION: Despite decreasing tissue thickness over time, fat grafting for forefoot fat pad atrophy significantly improves pain and disability outcomes and prevents worsening foot forces and pressures. Pedal fat grafting is a safe, minimally invasive approach to treat fat pad atrophy with minimal downtime. Future analysis will reveal whether fat grafting has lasting efficacy.

REFERENCES:

1. Garrow AP, Papageorgiou AC, Silman AJ, Thomas E, Jayson MI, Macfarlane GJ. Development and validation of a questionnaire to assess disabling foot pain. *Pain*. 2000;85(1-2):107-113. doi:10.1016/S0304-3959(99)00263-8.