

Autologous Fat Grafting for Pedal Fat Pad Atrophy: A Prospective Randomized Clinical Trial

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Level of Evidence: 2

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Plantar fat pad atrophy has several etiologies such as age, obesity, steroid injection, use of high heeled shoe, iatrogenic surgical consequence or abnormal foot mechanics. There are no prospective objective clinical trials with standardized fat grafting techniques to assess the efficacy in this treatment. This paper hypothesizes that pedal fat grafting can reduce pain, increase tissue thickness and decrease pedal pressure. A prospective randomized clinical trial of 30 adult patients were recruited. Plantar foot forces and pressure was collected using pedobarograph and ultrasound was used to document plantar tissue thickness under each metatarsal head. Subjects were placed in either the autologous fat transfer group (group 1) or the control group (group 2) for a year. Group 1 followed up at 2 weeks, 4 weeks, 2 months, 6 months and 12 months. Group 2 followed up in 6 months and 12 months.

Surgical procedure was performed at the UPMC Aesthetic Plastic Surgery Center. Fat grafting was obtained from abdominal or flank subcutaneous tissue. 50 to 100 cc of fat tissue was aspirated using a cannula through a 2mm incision. The resultant adipose tissue was transplanted to the areas of the foot plantarly, using 1cc syringes. An 18 gauge needle was used between the first and second toes and fourth and fifth toes. A 0.9mm blunt cannula was used to inject 1cc syringes of fat into the foot in a cross-hatched pattern. For patients that had a prior neuroma resection, 1cc of fat was injected dorsally to fill in any potential soft tissue defect between the metatarsal. A total of 4 to 6 cc of fat was placed on the plantar aspect of the foot. Results as below:

- Pain/function/work and leisure activities:
 - Baseline – no significant difference between groups.
 - 6 month – group 1 had significant improvement in pain
 - 12 month – group 1 had significant improvement in pain, function and work/leisure activities compared to the control group
- Tissue thickness:
 - Baseline – no significant difference between the groups.
 - 6 month – group 1 had a significant difference in tissue thickness. Group 2 experienced significant decrease in tissue thickness
- Pedal pressure:
 - Baseline – no significant difference between the groups
 - 6 month – group 1 had lower plantar pedal pressure compared to control group
 - 12 months – group 1 had significantly lower plantar pedal pressure compared to control group

The results showed that foot function, pain and work/leisure activities improved significantly when compared with the control group over 12 months. One pitfall of this study is that they only used one point under the metatarsal head when measuring thickness with ultrasound. It is possible that the fat was redistributed to help offload the metatarsal head; thus, magnetic resonance imaging may be a better assessment tool for the volumetric changes in the fat versus the author's ultrasound approach. Additional limitations to this study include sample size, patient compliance with keeping off their feet after surgery and this study did not make patients non weight bearing for an extended period of time, which may compromise the graft survival. Future analysis and studies are needed to reveal the lasting efficacy of this technique.



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