



Fat Pad Restoration

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www.fatpadatrophy.com

@bocafootandveindoc

@fatpaddoc



- University of Michigan
- Temple University
- Practice in Boca Raton, FL
- Board Certified Foot and Rearfoot- ABFAS
- 20 Years of experience with FPR



Learning Objectives

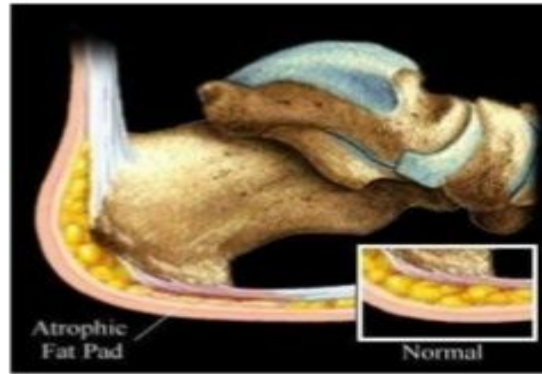
Define Fat Pad Atrophy

Understand the concepts of Fat Pad Restoration (FPR)

Comprehend treatments of fat pad atrophy in an office setting

WHAT IS FAT PAD ATROPHY?

- Adipose tissue covering the plantar aspect foot atrophies or displaces
- There is a loss of shock absorbing capacity → increase peak pressure forces in gait → painful ambulation, skin reactions

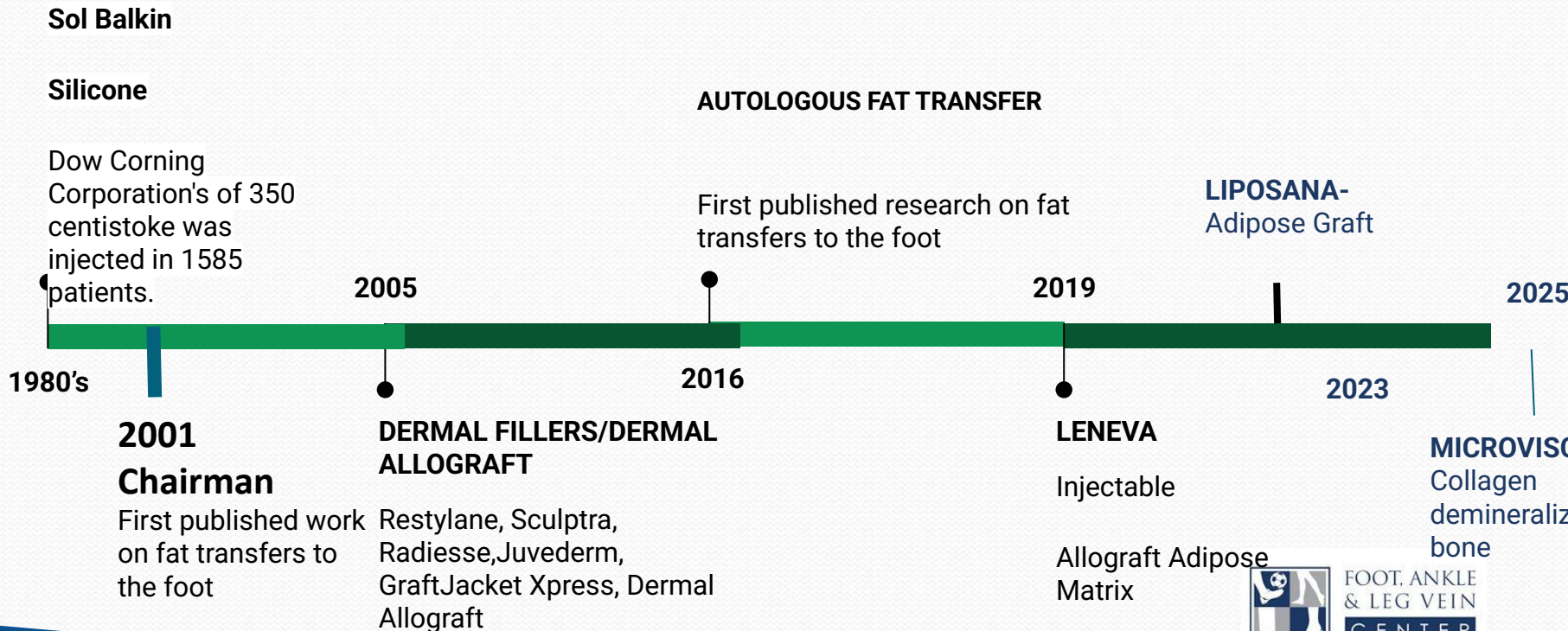


Causes of Fat Pad Atrophy/ Conditions Treated

- Diabetic Ulcerations- Wagner Stage 0 & Stage 1, Stage 2 (not infected)
- Collagen Connective Tissue Diseases- i.e. Rheumoid Arthritis causing joint deformities & skin breakdowns
- Traumatic Atrophy- i.e. calcaneal fractures
- Tissue Scarring
- Cortisone Induced Lipoatrophy
- Cavus Foot- Anterior displacement ball of the foot
- Mechanically induced hyperkeratotic lesions (corns/calluses)
- Sports Injuries, Injection through Micro needling- i.e. Plantar fasciitis and Achilles tendonosis
- Bunions, Tailor's Bunions, Hammer toes, Metatarsalgia, Heel Pain, Haglund's



TIMELINE OF FAT PAD RESTORATION IN THE FOOT



Sol Balkin

Silicone

Dow Corning Corporation's of 350 centistoke was injected in 1585 patients.

AUTOLOGOUS FAT TRANSFER

First published research on fat transfers to the foot

LIPOSANA- Adipose Graft

1980's

2005

2016

2019

2023

2025

2001

Chairman

First published work on fat transfers to the foot

DERMAL FILLERS/DERMAL ALLOGRAFT

Restylane, Sculptra, Radiesse, Juvederm, GraftJacket Xpress, Dermal Allograft

LENEVA

Injectable

Allograft Adipose Matrix

MICROVISIO

Collagen demineraliz bone

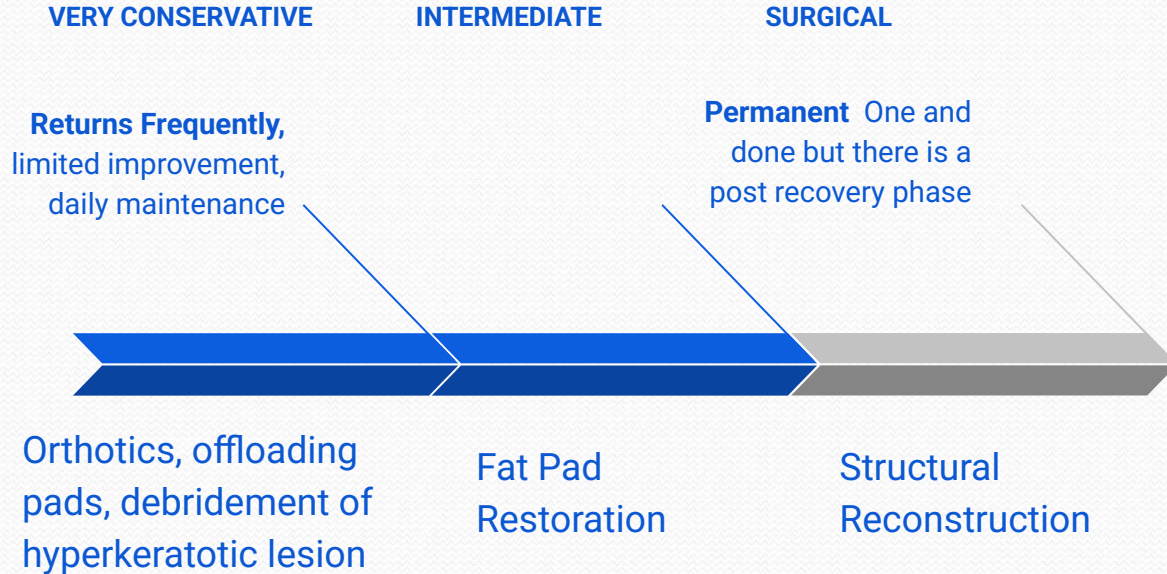
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WHERE DOES FAT RESTORATION FIT INTO YOUR CARE?



Fat Pad Atrophy Diagnostics

- X-ray- initial
- Ultrasound
- Gait Plate Scanning
- MRI
- Clinical

What is normal thickness?

Location	Resting Thickness	Weight-Bearing Thickness	Concerning Level
Heel	12–20 mm	9–15 mm	<10 mm
Metatarsal heads	6–10 mm	4–7 mm	<5–6 mm

A problem-based approach in musculoskeletal ultrasonography: heel pain in adults

Ultrasonography. 2021 Jun 29;41(1):34–52. doi: [10.14366/usg.21069](https://doi.org/10.14366/usg.21069) [Yong Hee Kim](#)

Preliminary Reference Values for Plantar Fat Pad Thickness Beneath the Metatarsal Heads and Its Relationship with Body Mass Index 2025 Dec 9;13(24):3219. doi: [10.3390/healthcare13243219](https://doi.org/10.3390/healthcare13243219).

ULTRASOUND



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Measure thickness from dermis to bone cortex

SUBDERMAL



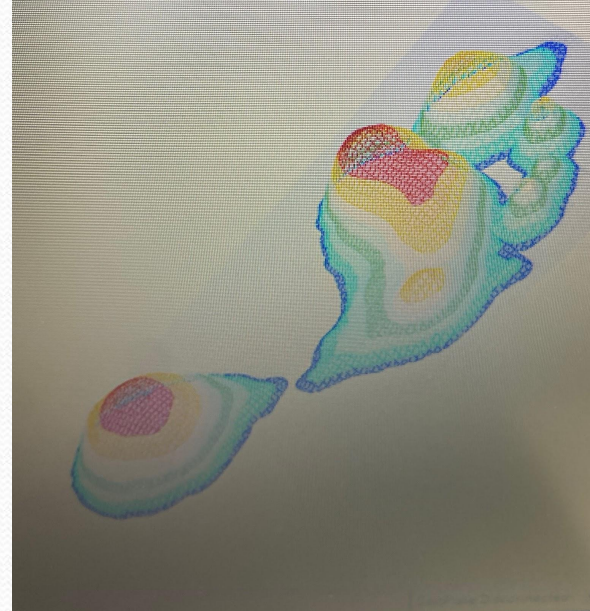
EXAMPLE: RIGHT
HEEL FAT PAD
MEASUREMENT

CORTEX OF BONE



Gait Scan Analysis

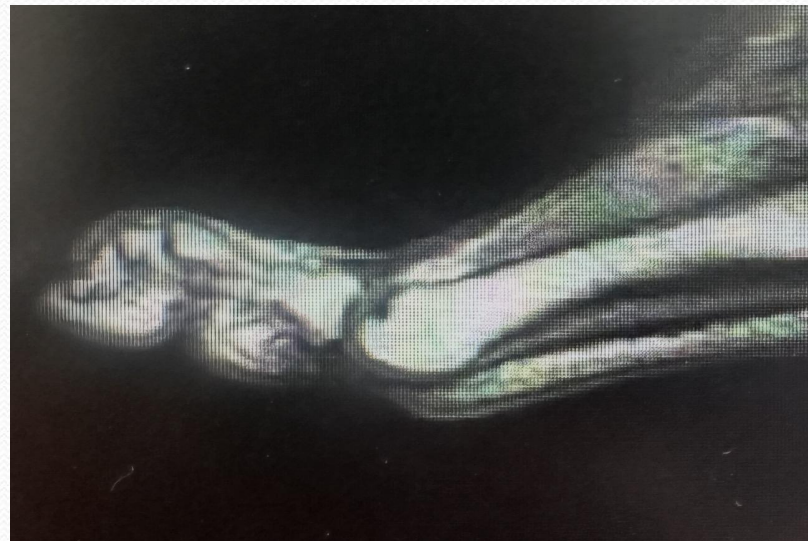
Submetatarsal Five decrease in peak pressure load



MRI



FAT



NO FAT



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MRI TO TRACK SUCCESS

Show increase in fat pad plantar foot SEPT 2006 and MARCH 2008 with almost 1/2cm increase in fat pad
before



after



WHAT IS FAT PAD RESTORATION?

The use of injectables with an adipose grafts, dermal fillers, dermal allografts or autologous fat transfer to

- Increase thickness of subcutaneous tissue
- Increased density of subcutaneous tissue
- Regenerate tissue - dermis and epidermis improvement
- Provide insulation around a nerve sheath for neural healing



PROCEDURE OPTIONS

1. Off the shelf injectables

SYNTHETIC

Restylane®- Hyaluronic Acid

Juvederm Voluma®- Hyaluronic Acid higher crossed linked

Sculptra®- Poly L Lactic Acid

Radiesse®- Calcium Hydroxyapatite

NATURAL

Leneva™- Adipose Allograft Matrix

Liposana™-- Cryopreserved Adipose Allograft

Alloclae™- Adipose Graft

2. Surgical allograft insertion

3. Fat transfer Autolipotransplation



We have the DATA!

Pilot Study: Fat Pad Restoration With Adipose Allograft In Patients With Metatarsalgia Resulted In Structural And Functional Improvement-retrospective evaluation of 10 patients Results: At 12 weeks, 9 of 10 treated feet showed increased fat pad thickness (mean gain 0.21cm, 65% improvement). FADI scores improved in 8 of 9 patients, with a mean increase from 66.0 to 84.2 (18.1 points); **PRS GLOBAL December 2025**

Early clinical experience with the use of a new allograft adipose matrix for foot fat pad restoration JS Gold - **Plastic and Reconstructive Surgery–Global Open, 2025 - journals.lww.com**

Pilot Study: Fat Pad Restoration With Adipose Allograft in Metatarsalgia Patients Shows Structural, Functional Improvement JS Gold - **Journal of the American Podiatric Medical Association, 2023 - japmaonline.org**

Pressure Offloading Injectable System (POIS): Evaluating the use of an injectable dermal filler for offloading painful pressure points during weight bearing activities J Schoenhaus, J Gold... - **Journal of the International Foot and Ankle Foundation 2022 - internationalfootankle.org**

Autologous Fat Grafting to the Plantar and Dorsal Aspect of the Foot for two Varying Indications–A Case Presentation J Schoenhaus - **J Aesthet Reconstr Surg, 2020**

Gusenoff Crew! A ton University of Pittsburgh- autologous fat transfer

Volumetric Analysis in Autologous Fat Grafting to the Foot. Ruane EJ, Minter DM, Wyse AJ, Gusenoff BR, Gusenoff JA. *Plast Reconstr Surg.* 2019 Sep;144(3)

Chairman EL: Restoration of the plantar fat pad with autolipotransplantation. ***J Foot Ankle Surg, 33(4):373–9.1994.***



POIS- pressure offloading injectable system

FDA approved study

Pressure Offloading Injectable System (POIS): Evaluating the use of an injectable dermal filler for offloading painful pressure points during weight bearing activities J Schoenhaus, J Gold... - Journal of the International Foot and Ankle Foundation 2022 - internationalfootankle.org

Prospective:

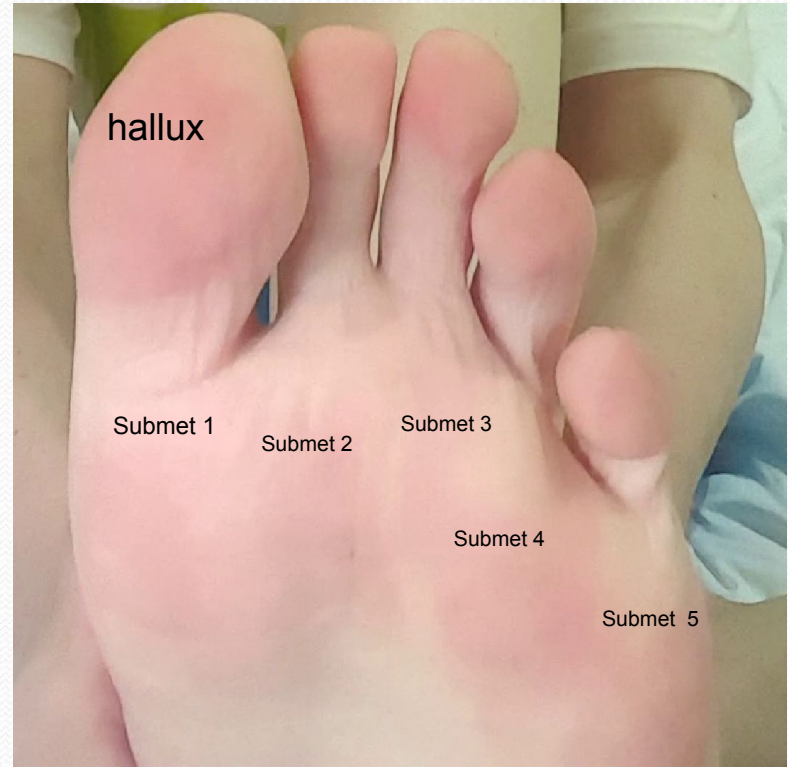
30 subjects

23 female/ 7 male

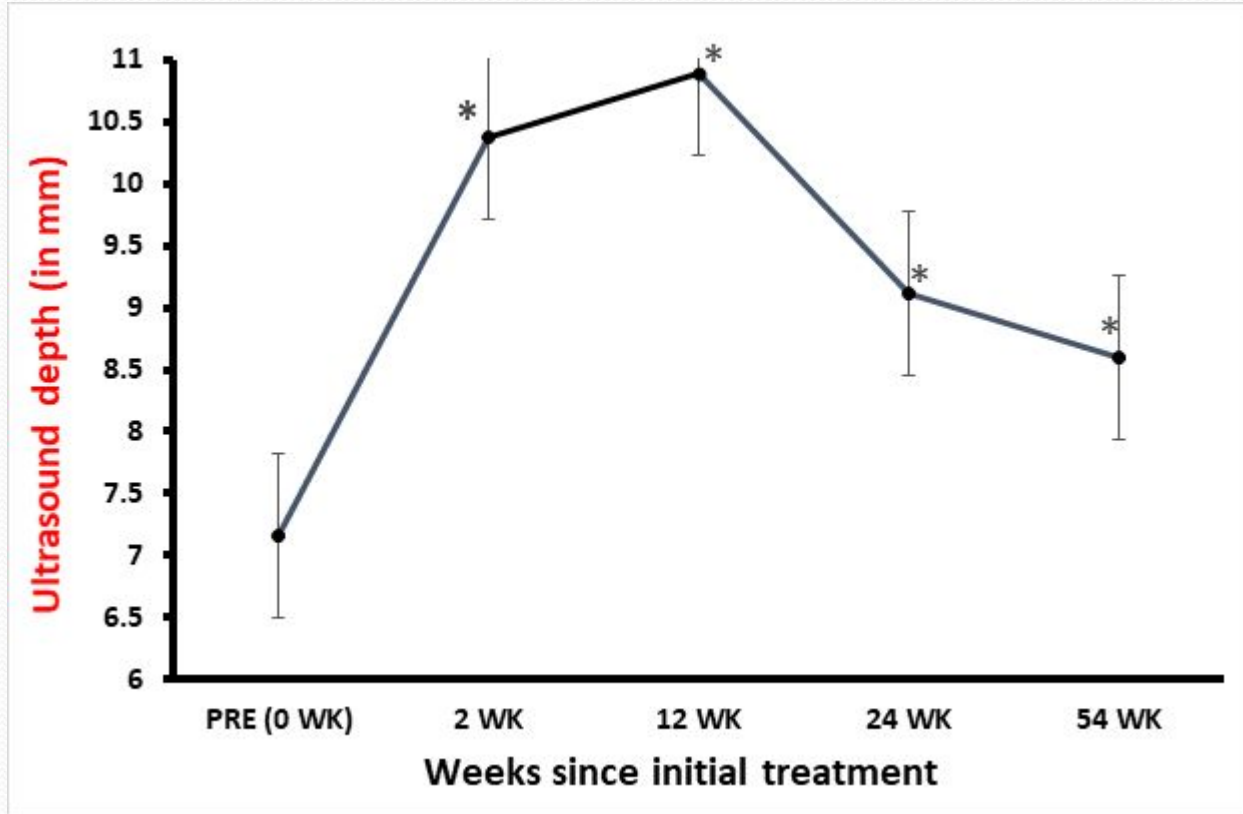
Average age 60.4

1mL per injection site

Injection site



Ultrasound Evaluation of Fat Pad Thickness



** 7.63mm pre injection submetatarsal fat pad thickness **
Mean 4mm improvement in thickness

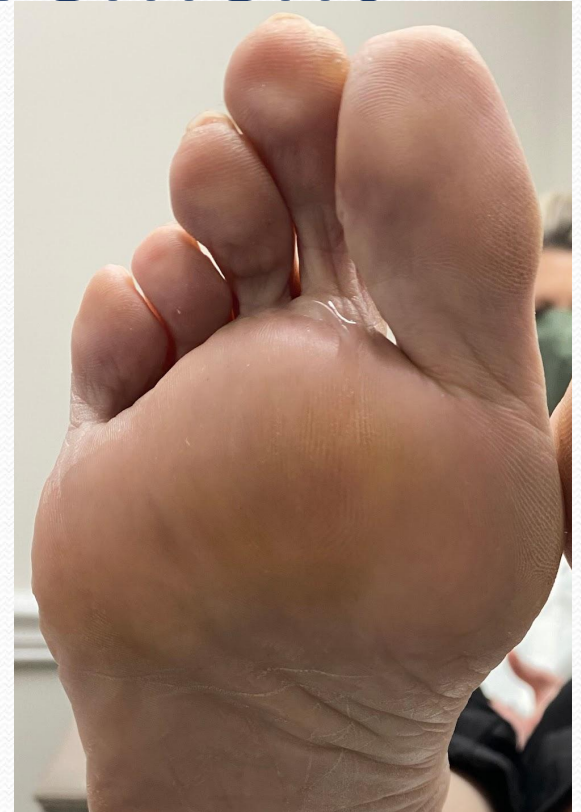
Clinical dermal Improvement



1/14/2020



Immediately Post



2/8/2021... 13 months

Pre procedure

Every patient- should get at least x-rays

Bonus- ultrasound for diagnostic and injection procedure

Gait scan

AOFAS scores pre and 12 weeks post injection

Consent

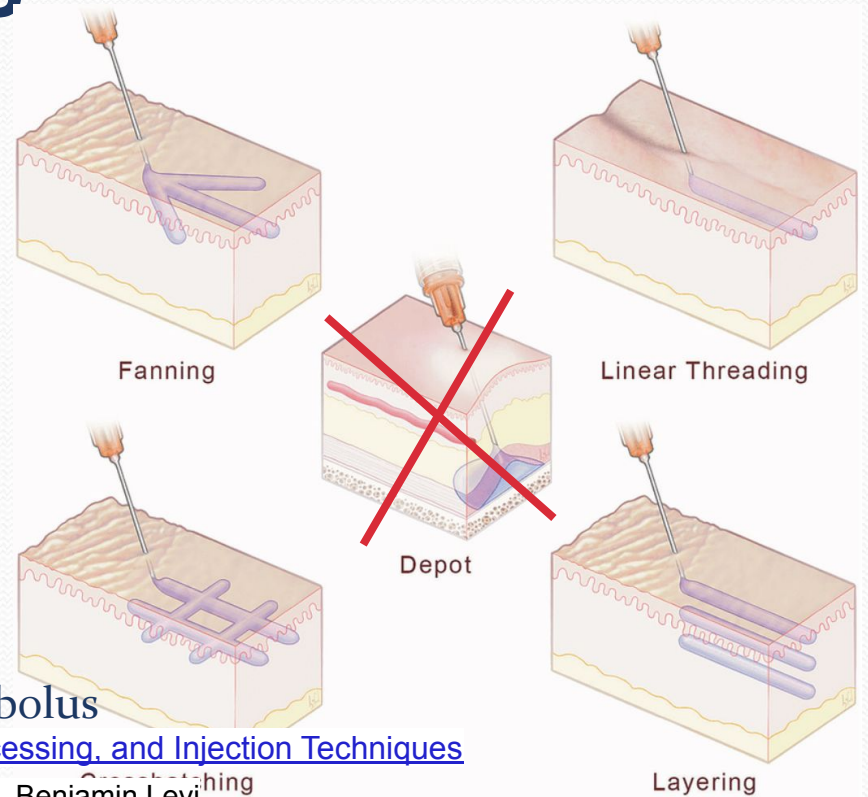
Photos

Payment outlined/ quote



INJECTION PRINCIPALS

- Follow fat grafting principles
- Use a microcannula to avoid NV structures
- Place small aliquots using retrograde injection technique
- Understand the depth
- Avoid a bolus



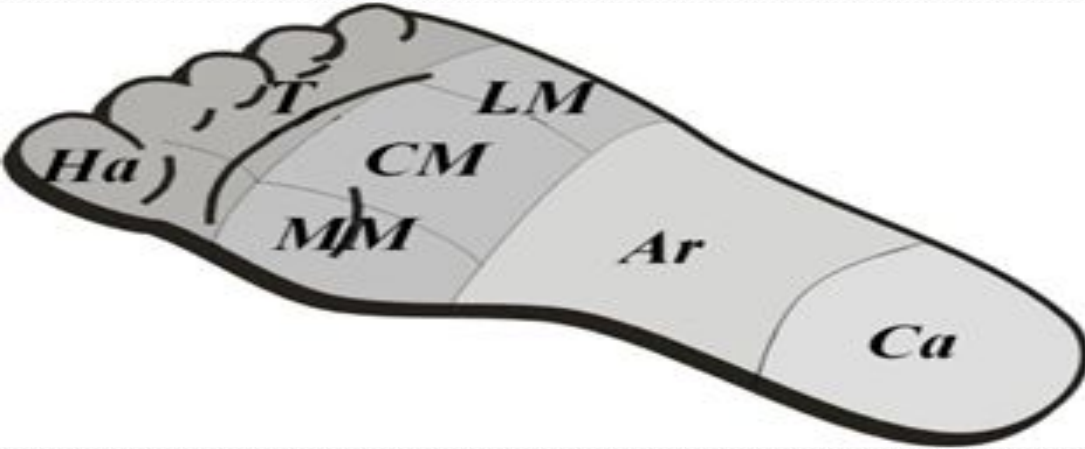
*Coleman- avoidance of central necrosis with bolus

[The Current State of Fat Grafting: A Review of Harvesting, Processing, and Injection Techniques](#)

Amy L. Strong, Paul S. Cederna, J. Peter Rubin, Sydney R. Coleman, Benjamin Levi

Plast Reconstr Surg. Author manuscript; available in PMC 2016 Oct 1. Published in final edited form as: Plast Reconstr Surg. 2015 Oct; 136(4): 897–912.

HOW MUCH DO I INJECT?



HA/ Toes- 0.5mL

Single spot

MM/CM/LM- 1.0-1.5mL

Double spot

MM + CM- 2.0-3.0

AR- 3.0- 4.5mL

CA- 3.0-4.5mL



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SUB TWO METATARSALGIA



Healed Ulceration- up to 40% wound recurrence within one year



- Restore Circulation/
Treat infection
- Heal wound
- Fat Grafting
Calcaneus- 3-4ml





1/14/26



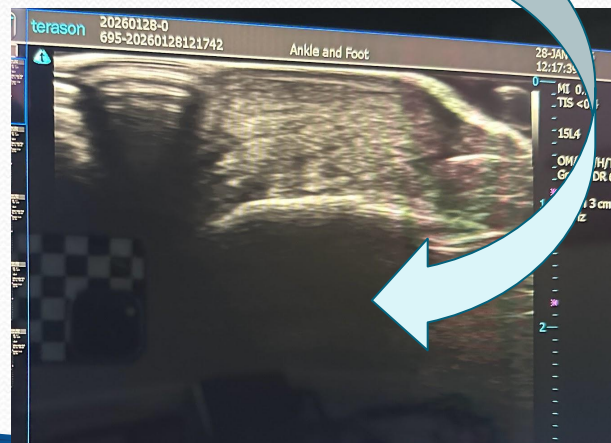
1/21/26



1/28/26



2/25/26



Post Injection Offloading Procedure

TWO WEEK PROTOCOL

In-vitro studies have shown adipose derived stem cells attach, infiltrate and differentiate into adipocytes within 7-14 days.

Plast Reconstr Surg. 2019 Jul;144(1):264.

1. Off- loading pads- provide for patient and have them take a photo with THEIR phone so they know where to place the pads
2. Sneaker, Orthopedic Sandal, Post op Shoe, CAM boot or TCC- no high heels
3. Minimal low impact activity



Post Procedure

Patient leaves with Procedure Pocketbook

- Post procedure instructions
- Post Procedure Offloading Pictures
- Ice Pack
- Squeeze Ball they had during the procedure
- Extra Pads
- Post procedure Shoe- either tall boot, post op forefoot offloading shoe, post op shoe or heel relief shoe



GRADE 1 NEUROPATHIC ULCERATION MRI TO RULE OUT OSTEOMYELITIS



October 19, 2016



December 21, 2016

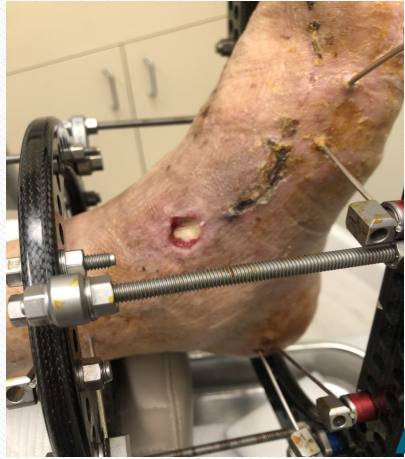


March 2019



GRADE 2 WAGNER TIBIALIS ANTERIOR EXPOSED

DECEMBER 11, 2019



JANUARY 8, 2020



JANUARY 15, 2020



FEBRUARY 20, 2020



**DECEMBER 26, 2019
OR FRAME REMOVAL,
DEBRIDEMENT
GRAFTING**



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Neuropathic Diabetic Patient with Capillary Bleeding into Dermal Callus. Noncompliant, Neuropathic, Previous Osteomyelitis..

July 10, 2019

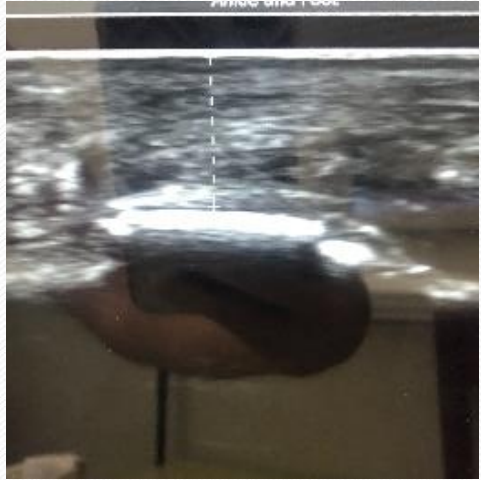


January 5, 2020



ULTRASOUND IMAGING TO FOLLOW CARE

Pre injection- No Allograft
May 30, 2019



Immediate post injection



10 weeks post injection
August 15, 2019



ULTRASOUND IMAGING OF ALLOGRAFT AT 10 WEEKS IN SUBCUTANEOUS TISSUE

FIFTH METATARSAL MALUNION

DECEMBER 9, 2019



JANUARY 6, 2020



May 5, 2020



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HALLUX GRADE 1 ULCERATION WITH PERIPHERAL ARTERIAL DISEASE



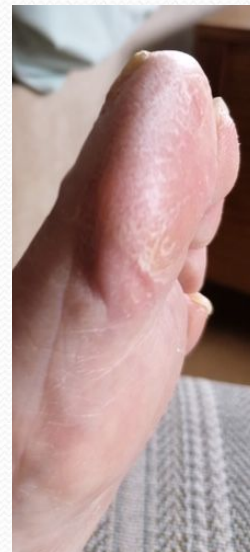
NOVEMBER 3, 2017



FEBRUARY 2, 2019



APRIL 9, 2020
IPAD PATIENT PHOTO



WHAT ARE SOME ADVERSE REACTIONS?

Injection site cellulitis. Resolved with oral antibiotics

Localized Capsulitis- entered the joint. Short term oral anti inflammatories with complete resolution. No long term i

Worst Case Scenarios- It doesn't work and patient needs a tou

DOES IT MIGRATE and DOES IT LAST?

8/27/18

Pre injection
Painful Tailor's Bunion



8/27/18

Immediately Post



11/15/18

11 weeks Post



3/9/20

19 Months

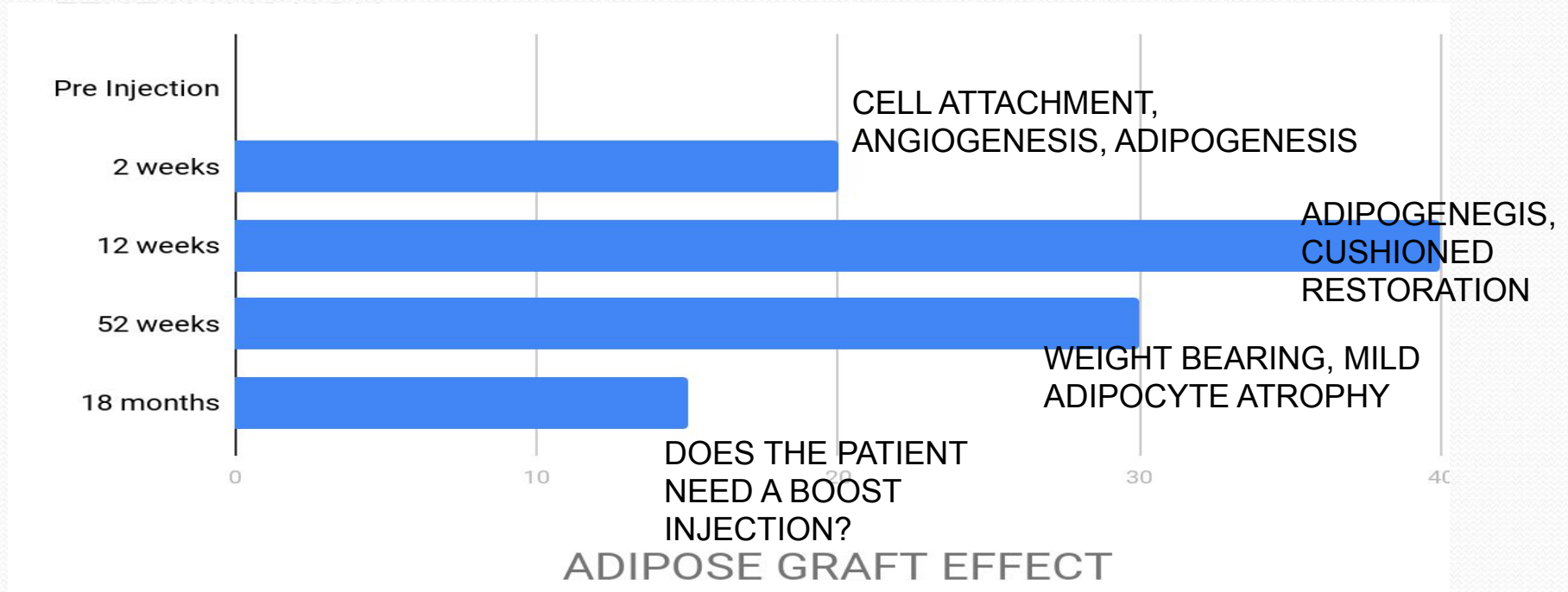


5/1/21

33 Months



DOES IT LAST?



Is the treatment covered by insurance?

- No office insurance coverage
- Possible operating room coverage indication for soft tissue augmentation.
- That's OK

THANK YOU!



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