AeroSpring Plantar Fascia Offloading System

Clinical Indications:

Severe recalcitrant plantar heel pain syndrome

Features:

1. Carbon fiber ankle foot orthosis

- controls ankle joint dorsiflexion and load on the Achilles tendon
- limits extension of 1st MTPJ: primary mechanism of plantar fascia strain

2. Custom functional foot orthosis (one pair)

- controls rearfoot pronation
- supports medial longitudinal arch and transverse tarsal arch

- patented "Richie ArchLock™" offloads the medial-central band of the plantar fascia

3. Graduated Heel Wedges - Offloads both Achilles tendon and the central band of the plantar fascia

Mechanism

During standing and walking, the plantar fascia is subjected to elongation strain by:

- the Achilles tendon located immediately proximal
- the "tie rod" component of the truss mechanism of the arch
- the tension created by the windlass mechanism at the first metatarsophalangeal joint

With severe recalcitrant cases of chronic plantar heel pain, clinicians often prescribe walking boots which address some, but not all of these damaging mechanisms. Walking boots have numerous disadvantages which lead to poor patient compliance:

- limb length discrepancy causing hip and back pain
- bulky and heavy causing knee pain

- need for removal when driving an automobile

*Compared to walking boots, this dynamic brace system does not create a limb length discrepancy and can be easily dis-engaged for driving an automobile.

A brace system has been developed to simultaneously address all three of three loading mechanisms of the plantar fascia. The result is a three-step approach to minimize the mechanical strain on the plantar fascia during standing and walking.

Superior to walking boots, the Richie AeroSpring Plantar Fascia Offloading System addresses the biomechanics of foot function to reduce strain on the plantar fascia. A custom balanced orthotic foot bed contours to the medial and lateral longitudinal arches. Heel wedges combined with the shank countour of the foot orthoses has been documented to offload the central band of the plantar fascia. See: Kogler GF, Veer FB, Verhulst SJ, Solomonidis SE, Paul JP. The effect of heel elevation on strain within the plantar aponeurosis: In vitro study Foot & Ankle IntemationalNol. 22, No. 5/May 2001

The patented Richie Wedge offloads the medial-central band of the plantar fascia. See: Kogler, G.F., Veer, EB., Solomonidis, S.E., Paul, J.P.: Theinfluence of medial and lateral placement of orthotic wedges on loading of theplantar aponeurosis. In vitro study. Journal of Bone and Joint Surgery 81-A:1403-1413, 1999.

The Richie AeroSpring Plantar Fascia Offloading System therefore addresses all three levels of mechanical strain on the plantar fascia, unlike any orthotic system on the market today. The comfort and dynamic spring effect of this system will assure better patient compliance than any other offloading device available.

Reimbursement*:

Reimbursement for the carbon fiber AFO:
Billed under code L1932
Average reimbursement for 2021: Ceiling $1066 Floor $800
Reimbursement for the Pair of Foot Orthotic:
Billing code L3000
Average reimbursement: $400

Note: Reimbursement varies among payors and region. No guarantees or assurances for reimbursement are implied with this document. Suppliers must contact each payor to verify coverage and reimbursement amounts.

REFERENCES

The first orthotic system to simultaneously address the three major deforming forces on the plantar fascia. These studies verify the deforming forces contributing to plantar fasciopathy and plantar heel pain:

A. Achilles tendon

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Carlson RE, Fleming LL, Hutton WC. The biomechanical relationship between the tendoachilles, plantar fascia and metatarsophalangeal joint dorsiflexion angle. Foot and Ankle International 2000;21:18–25 [11]

Gefen A. The in vivo elastic properties of the plantar fascia during the contact phase of walking. Foot and Ankle International 2003;24:238–44.

B. Hindfoot pronation and deformation of the Medial longitudinal arch

Chen, W.P., Tang, F.T., Ju, C.W., 2001. Stress distribution of the foot during mid-stance to push-off in barefoot gait: a 3-D finite element analysis. Clinical Biomechanics 16 (7), 614–620.

Wu, L., 2007. Nonlinear finite element analysis for musculoskeletal biomechanics of medial and lateral plantar longitudinal arch of virtual Chinese human after plantar ligamentous structure failures. Clinical Biomechanics 22 (2), 221–229.

Ferber R, Benson B. Changes in multi-segment foot biomechanics with a heat-mouldable semi-custom foot orthotic device. *J Foot Ankle Res.* 2011;4:18.

Chang R, Rodrigues PA, Van Emmerik REA, Hamill J. Multi-segment foot kinematics and ground reaction forces during gait of individuals with plantar fasciitis .Journal of Biomechanics 47 (2014)

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C. Windlass mechanism

Carlson, R.E., Fleming, L.L., Hutton, W.C., 2000. The biomechanical relationship between the tendoachilles, plantar fascia and metatarso- phalangeal joint dorsiflexion angle. Foot and Ankle International 21 (1), 18–25.

Cheng HY, Lin CL, Wang HW, Chou SW. Finite element analysis of plantar fascia under stretch—The relative contribution of windlass mechanism and Achilles tendon force Journal of Biomechanics 41 (2008) 1937–1944

Lin SC, Chen CPC, Tang SFT, Wong AMK, Hsieh JH, Chen WP. Changes in windlass effect in response to different shoe and insole designs during walking . Gait & Posture 37 (2013) 235–241