Allied OSI Labs THE Richie BRACE®

Your Bracing Partners... *Every Step of the Way.*

Achieving Maximum Success with the Richie Brace®

The Richie Brace® has a long track record of remarkable success in thousands of patient fittings. Outcomes are favorable with very little need for adjustment or remake. In these relatively rare instances, the problem with fitting, comfort, and relief of symptoms comes down to several simple factors which may have been overlooked by the prescribing practitioner.

This guide is to help assist with your patient's diagnosis and to provide brace recommendations and modification tips.

If you have questions, please contact the Allied OSI Labs client service team at 800.444.3632 or clientservice@aolabs.com

Table of Contents

PATIENT EVALUATION

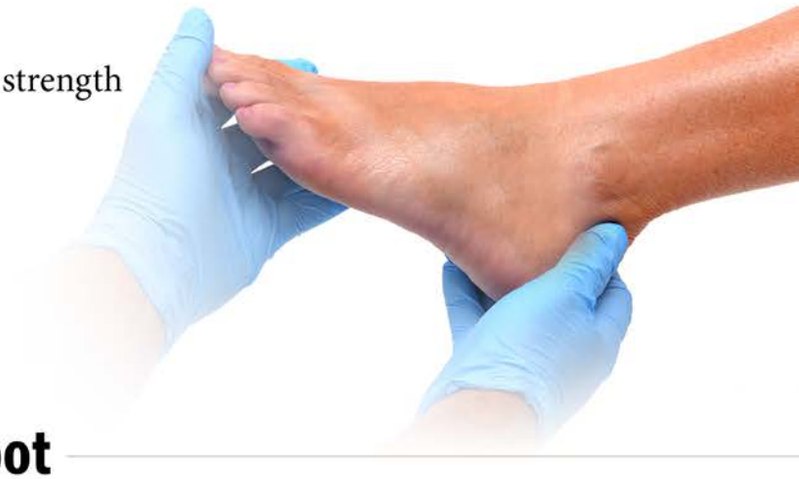
Adult-Acquired Flatfoot

Gait Analysis
- Hindfoot everted beyond 10 degrees
- Forefoot abducted on rearfoot
- Sagittal plane midfoot break

Range of Motion
- Can subtalar joint invert to neutral?
- Can patient actively invert past midline?
- Is adequate ankle dorsiflexion available?

Muscle Testing
- Side-to-side comparison of tibialis posterior strength
- Is there spasticity of the peroneals?

Stage Deformity
- Stage 2 deformity: flexible
- Stage 3 deformity: rigid
- Forefoot supinatus: flexible or rigid?



Dropfoot

Gait Analysis
- Knee stability
- Weakness: quads, calf, ankle extensors
- Equinus or lack of heel strike
- Foot alignment at heel strike, midstance, and toe off

Range of Motion
- Can the ankle joint be dorsiflexed to neutral?
- Is there a normal range of subtalar joint motion?
- Is there evidence of spasticity or contracture?

Deformity
- Is it fixed or flexible/reducible?
- Is it the result of muscle weakness or tightness?

Muscle Testing
- What muscle groups are affected in dropfoot?
- Is excessive knee flexion due to weak soleus and quads?

CASTING

Select the Proper STS Casting Sock

Ankle socks or plaster splints can be used for:

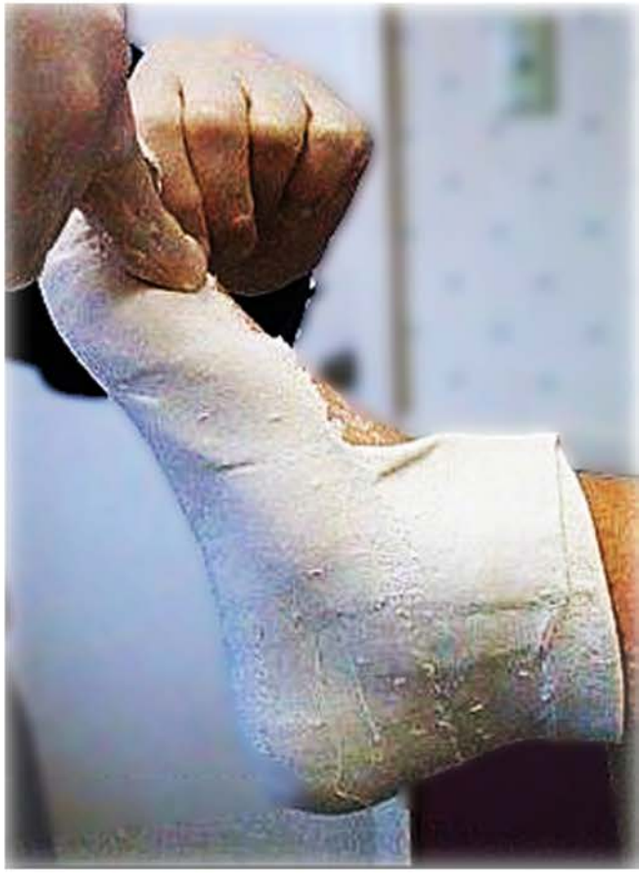
- Richie Brace® Standard
- Richie Brace® Restricted Hinge (with or without arch suspender)
- Richie Brace® Dynamic Assist

Mid-length socks must be used for:

- Richie Brace® Gauntlet
- Richie Brace® California AFO
- Any Richie Brace® where there is severe abnormality in lower leg girth (wide or thin) or structural abnormality, such as in extreme tibial varum (over 10°). Also use with the Richie Brace® Restricted Hinge when dropfoot and equinus are present.

Bermuda socks must be used for:

- Richie Brace® Solid AFO



Markings

- Medial and lateral malleoli - assures accurate hinge placement
- 1st and 5th MTP joints - assures proper footplate length
- All bone prominences that need accommodation

Neutral-Suspension Casting Technique

The Richie Brace® achieves better outcomes than the competition, due partly to our requirement to cast the patient in a non-weight bearing position. This preserves the shape of the plantar surface of the foot, especially the heel and arch contours, as well as the metatarsal weight-bearing parabola.

Positioning the Foot During Casting

- Knee flexed 20-40 degrees
- Subtalar joint positioned in neutral
- Midtarsal joint "locked" or fully pronated
- First ray plantarflexed to end range (i.e. remove all forefoot supinatus deformity)

Note: Pronating the midtarsal joint while plantarflexing the first ray maximally everts the forefoot on the rearfoot…a vital requirement to achieve maximum foot stability with the Richie Brace® products.

ADULT-ACQUIRED FLATFOOT

Condition Description

Adult-acquired flatfoot is a progressive symptomatic deformity of the ankle and hindfoot resulting from attenuation and tear of the posterior tibial tendon, as well as other key ligament structures. This deformity is characterized by:

- Severe valgus alignment of the hindfoot
- Collapse of the medial longitudinal arch and abduction of the forefoot

Key Points of Biomechanical Control

- Prevent internal rotation of the tibia which limits subluxation of the talonavicular joint
- Prevent abduction of the forefoot.
- Preserve ankle joint motion when possible

Brace Recommendations

- Stage 1: Use foot orthoses initially, and consider the Richie Brace® Standard if treatment fails
- Stage 2: Flexible hindfoot: Richie Brace® Standard
- Stage 3: Rigid hindfoot: Richie Brace® Restricted Hinge with Medial Arch Suspender

STAGE 1

Custom Orthotic

Shown Here: Allied OSI Labs Custom Plus Hybrid

STAGE 2

Flexible Hindfoot: Richie Brace® Standard

STAGE 3

Rigid Hindfoot: Richie Brace® Restricted Hinge with Medial Arch Suspender

Casting

For Richie Brace® Standard or Richie Brace® Restricted Hinge with Arch Suspender, plaster splints or the STS Ankle Casting Sock may be used. NOTE: Medial and lateral malleoli markings are required.

Modifications

- 6mm medial heel skive
- Lateral flange
- For heavier patients: 4.0 poly shell material
- For enhanced stiffness: flat rearfoot post replaces standard stabilizer bar and crepe arch filler
- For severe forefoot abduction: add forefoot strap
- Stage 4 deformity: severe valgus ankle with DJD of ankle and subtalar joints:
  - Richie Brace® Gauntlet or Richie Brace® California AFO
  - Cast with STS midleg sock, capture height (minimum) of 7 inches

Removing Forefoot Supinatus

For all patients with adult-acquired flatfoot:

- Patient must be casted nonweight-bearing, neutral suspension technique
- Be sure to push down on 1st ray and remove all forefoot supinatus
- **This is most important when treating adult-acquired flatfoot**

TENDINOPATHY & TENDON RUPTURE

Condition Description and Patient Evaluation

Patients with **tendinopathy** often experience tenderness and pain with movement of the injured tendon and/or the surrounding tendon area. The pain is sometimes experienced with touch only, and no movement. The pain may be acute or chronic. Acute pain is usually paired with inflammation of the tendon. Depending on the type of tendinopathy, the goal of the Richie Brace® is to limit either plantar or dorsiflexion and provide immobilization for healing.

When a patient experiences an **Achilles tendon rupture**, there will be an immediate shock of pain in the rearfoot/ankle, as well as the base of the calf muscle. When this occurs, a "popping" sound is usually present, followed by pain and severe swelling.

Posterior Tibial Tendinopathy

PTTD - also known as adult-acquired flatfoot. See page 4 for adult-acquired flatfoot treatment.

Peroneal Tendinopathy

- **Treatment goal**: limit ankle inversion and plantarflexion
- **Brace recommendation**: Richie Brace® Restricted Hinge
  It is important to measure any tibial varum in relaxed stance and to have the lab adjust limb uprights for any tibial varum exceeding 10°
- **Brace modifications**: lateral heel skive
- **Posting**: valgus RF post | 2° - 4 °
- Extended forefoot valgus sulcus wedge | 2° - 4 °

Richie Brace®
Restricted Hinge

Anterior Tibial Tendinopathy *(Common in active female patients)*

- **Treatment goal**: limit ankle plantarfexion
- **Brace recommendation**: Richie Brace® Dynamic Assist
  NOTE: Consider the OTC Dynamic Assist if there is minimal foot deformity

Richie Brace®
Dynamic Assist

Achilles Tendon Rupture and Tendinopathy

- **Treatment goal**: limit ankle dorsiflexion
- **Brace recommendation #1**: AeroSpring Achilles Offloading System
  - Brace modifications: Graduated 20mm heel wedge
- **Brace recommendation #2**: Richie Brace® Restricted Hinge
  - Brace modifications: set brace in 10 equinus with ¼" heel lift

Richie Brace®
Restricted Hinge

AeroSpring Achilles
Offloading System

The Benefits of Choosing the Richie AeroSpring Bracing System® over a Walking Boot

1. Dynamic Loading
2. Full Weight-Bearing
3. Optimal heel elevation & ankle plantar flexion angle (10°-20°)

DJD

Condition Description and Patient Evaluation

Degenerative joint disease (DJD) is a form of arthritis. Patients with DJD suffer from pain due to inflammation in their joint cartilage. Many times, the cartilage can be worn down completely and then lost.

The Richie Brace® can relieve symptoms of DJD, particularly in the ankle and subtalar joint. Some of the most positive and life-changing experiences with the Richie Brace® have resulted from treating DJD of the ankle where no other viable treatment options have been available to the patient. **The goals of brace intervention:**

- Limit motion
- Decompress a joint surface

Choosing the Richie Brace® Standard

Richie Brace®

- The Richie Brace® Standard (with flat rearfoot post) is recommended for patients with **subtalar arthritis**.
- If the patient also has significant varus or valgus alignment of the calcaneus, add medial heel skive (valgus deformity) or lateral heel skive (varus deformity) to decompress the affected side of the subtalar joint.

Choosing the Restricted Hinge

Richie Brace® Restricted Hinge

- The Richie Brace® Restricted Hinge is recommended for patients with **ankle arthritis**.

PATIENT EVALUATION NOTE: Check for fixed equinus and adjust the angle of footplate accordingly. If the ankle mortise is compressed in varus/valgus direction, add a medial heel skive to decompress valgus deformity or add a lateral heel skive to decompress a varus deformity. Posting of the brace in rearfoot, forefoot, or both can also be utilized to decompress frontal plane deformity of the ankle.

Choosing the Gauntlet or the California AFO

Richie Brace® Gauntlet

The Richie Brace® Gauntlet or the Richie Brace® California AFO are recommended when there is **global DJD of the ankle, subtalar joint, and midfoot and where there is severe deformity.**

NOTE: In most cases, the Richie Brace® Restricted Hinge will work just as well and offers far better shoe fit and ease of wearing.

Richie Brace® California AFO

DROPFOOT

Condition Description and Patient Evaluation

Patients have difficulty lifting the front part of the foot and the toes tend to drag across the ground when walking. Depending on the patient's evaluation, practitioners should choose one of the following Richie Braces® for Dropfoot: **Dynamic Assist, Solid AFO, Restricted Hinge, or the AeroSpring Dropfoot Stability System.**

Richie Brace® Dynamic Assist

Choosing the Dynamic Assist

The Richie Brace® Dynamic Assist will achieve a **heel strike** and a **normal gait pattern** for patients with dropfoot *if the following patient conditions are present:*

- Range of motion in the ankle joint is able to reach 90° (foot to leg)
- Posterior calf musculature is strong
- Good knee stability
- Lack of hindfoot deformity ***NOTE: Stroke patients, as well as patients with common peroneal nerve injuries, meet this criteria.***

Choosing the Solid AFO

The Richie Brace® Dynamic Assist is **preferred for all dropfoot conditions** *but will fail if the following patient conditions are present:*

- Knee instability
- Fixed equinus
- Spasticity
- Weak calf (consider Solid AFO or Restricted Hinge)

In these cases, the most appropriate brace is the Richie Brace® Solid AFO.

Richie Brace® Solid AFO

Choosing the Restricted Hinge

The Richie Brace® Dynamic Assist is **preferred for all dropfoot conditions** *but will fail if the following patient conditions are present:*

- Severe varus
- Severe valgus
- Weak calf (consider Richie Brace® Solid AFO or Richie Brace® Restricted Hinge)

In these cases, the most appropriate Richie Brace® is the Restricted Hinge.

Richie Brace® Restricted Hinge

Dropfoot treatment is continued on the next two pages.

Choosing the Restricted Hinge (continued)

Dropfoot with Severe Varus or Valgus Deformity

In Charcot-Marie-Tooth Disease or other common peroneal nerve injuries, there is often an acquired cavo-adducto-varus deformity of the foot.

The varus condition combined with dropfoot requires the following prescription modifications:

- Measure tibial varum and ask the lab to bend uprights when tibial varum exceeds 10°
- Add 6mm lateral heel skive
- Add 4° valgus sulcus wedge (extended forefoot post)
- Add 4° valgus rearfoot post for extreme cases

Severe varus conditions that arise from neuromuscular pathologies often require footwear modifications such as a valgus midsole wedge.

Dropfoot with Equinus

When equinus is present, this condition is better controlled with the Richie Brace® Restricted Hinge.

The brace must hold the foot in the maximum dorsiflexion position that is allowed to each specific patient. This requires that the footplate be aligned at the ankle in a plantarflexed position.

This position must be measured and designated by the prescribing doctor based upon measurements of maximum range of ankle dorsiflexion available to that patient.

This requires the laboratory to make some modifications based upon the deformity captured in the impression cast. **However, the STS mid-leg casting sock must be used!**

Additionally, this allows accurate measurement of fixed equinus but requires the practitioner to:

- Cast the patient in a non-weight bearing position with the knee flexed to at least 45°.
- Dorsiflex the ankle to end range during the casting process.
- When this brace is fixed in equinus, a heel lift should be applied to bring the limb uprights to perpendicular. The heel lift will also aid in achieving a heel strike when equinus deformity is present.
- Remember to apply a heel lift to the contralateral shoe!

Dropfoot treatment is continued on the next page.

DROPFOOT

Choosing the AeroSpring Dropfoot Stability System

Richie AeroSpring Bracing System®

In cases of dropfoot caused by stroke or nerve injury where there is no spasticity and the knee is stable, the Richie Brace® Dynamic Assist would be recommended. However, when there are neurologic conditions resulting in some degree of posterior leg weakness or contracture as seen in Charcot Marie Tooth disease, the Richie AeroSpring Dropfoot Stability System can provide additional support and improved gait efficiency.

Mechanism

Traditional solid shell plastic AFOs designed to treat dropfoot provide support primarily during the swing phase. A carbon fiber AFO (like the AeroSpring) with latearal strut can add the additional benefit of dynamic recoil during the third rocker to aid in push-off propulsion.

- Carbon fiber AFO - controls ankle joint dorsiflexion and load on Achilles tendon
- Custom functional orthotic - controls rearfoot pronantion and patented "Richie Wedge" lateral offloads the medial-central band of the plantar fascia
- Carbon fiber footplate with toe rocker - diminishes dorsiflexion of the MTPs and engagement of the windlass

The lightweight dynamic features of the Richie AeroSpring Dropfoot Stability System allows the otherwise healthy patient to engage in walking or running for exercise. Dynamic carbon fiber AFO devices have shown to improve push-off while optimizing energy expenditure during walking. The possibility for participation in sports or exercise would not be possible with most bulky solid shell AFO devices but is now feasible with a carbon fiber brace system.

Contraindications

- Severe instability of the knee; mild-to-moderate instability in the sagittal plane can be controlled with the Richie AeroSpring Bracing System.
- Severe ankle joint contracture with equinus; the Richie AeroSpring Bracing System incorporates a carbon fiber brace with a footplate aligned at 90°. Some compensation can be achieved by incorporating a heel wedge to balance equinus.

LATERAL ANKLE INSTABILITY

Condition Description

Lateral ankle instability is a condition which causes a patient's ankle to "give way". Lateral ankle instability is prevalent during activities such as running, walking, and sometimes even just standing.

Richie Brace®

Brace Recommendation

Standard Richie Brace®

Key Points of Patient Evaluation

Hindfoot Varus

- If there is **NO** significant varus alignment of the hindfoot, no need for any additional modifications
- If there **IS** significant varus alignment of the hindfoot, the following modifications are recommended:
  - 6mm lateral heel skive
  - 2–4 degree valgus sulcus wedge
  - Medial flange

LISFRANC SPRAINS

Condition Description

Lisfranc (midfoot) injuries are present when the tarsometatarsal (TMT) joints tear. If misdiagnosed (as it often is), the injury will worsen and become harder to heal in a much longer amount of time. The disability can sometimes become permanent.

Treatment of the sprain, where the midfoot joints are stable with no evidence of diastasis, usually requires immobilization in a walking boot for a minimum of 8 weeks. When open reduction and internal fixation is required, the post-operative course requires up to 12 weeks of boot immobilization.

Walking boots address several deforming forces on the TMT joints but do not provide proper arch support to prevent sagittal plane collapse across the midfoot joints. The bulk and the limb length discrepancy imposed by walking boots discourages long-term use and can lead to decreased patient compliance with poor clinical outcomes.

Lisfranc sprains treatment continued on the next page.

LISFRANC SPRAINS

Brace Recommendation

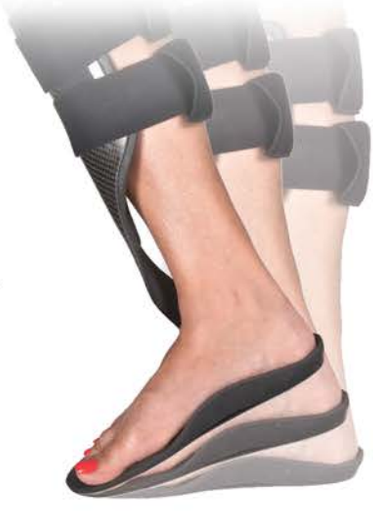
Richie AeroSpring Bracing System®

We recommend the Richie AeroSpring Midfoot Offloading System when patients are showing little to no positive response to traditional treatment options. This new alternative to walking boots is available for patients facing long-term immobilization after a midfoot sprain. The lightweight carbon fiber brace allows ease of ambulation while the thin composite footplate will not disrupt leg length. The brace can be loosened at the proximal attachment to allow full mobility of the ankle while driving an automobile.

- **Carbon fiber ankle foot orthosis** - controls ankle joint dorsiflexion and load on the Achilles tendon
- **Custom functional foot orthosis** - controls rearfoot pronation
- **Carbon fiber footplate with toe rocker** - diminishes dorsiflexion of the MTPs and engagement of the windlass
- **Graduated heel wedges (10mm)** - lateral offloads the medial-central band of the plantar fascia

Mechanism

The Richie Aerospring Midfoot Offloading System is designed to improve the protection of the midfoot joints provided by walking boots. While walking boots reduce load on the midfoot from the Achilles and provide a rigid rocker sole, there is no arch contour which is critical to support the TMT joints.



The new AeroSpring provides a brace to limit Achilles loading, a rigid carbon footplate to reduce bending movement across the midfoot joints, and a custom contoured foot orthosis to prevent sagittal plane collapse of the TMT joints. A graduated heel lift system further offloads the Achilles and the midfoot joints.

HEEL PAIN

Severe Recalcitrant Plantar Heel Pain Syndrome

Condition Description

Plantar fasciitis is the most common cause for heel pain in adults. Additionally, this condition is CHRONIC. More than half of patients who suffer from plantar fasciitis will experience heel pain for a period lasting more than two years.

Brace Recommendation

We recommend the AeroSpring Plantar Fascia Offloading System when patients are showing little to no positive response to traditional treatment options.

Richie AeroSpring Bracing System®

Mechanism

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

- Achilles tendon located immediately proximal
- "Tie rod" component of the truss mechanism of the arch
- 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

The Richie AeroSpring Bracing System® has been developed to simultaneously address all three of three loading mechanisms of the plantar fascia. The result is a three-prong 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 footbed contours to the medial and lateral longitudinal arches. Heel wedges combined with the shank countour of the foot orthoses have been documented to offload the central band of the plantar fascia. The patented Richie ArchLock™ offloads the medial-central band of the plantar fascia.

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