Ankle Foot Orthoses in Prevention and Treatment of Heel Pressure Ulcers: A Physical Therapy Perspective

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Background

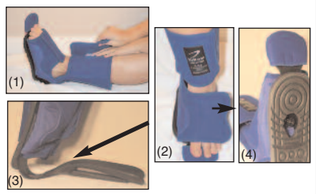
In 2007, the Institute for Healthcare Improvement (IHI) initiated the 5 Million Lives Campaign to prevent pressure ulcers. As a result, physical therapists must take accountability for the identification of patients at risk of developing pressure related injury. Currently, there is a multitude of ankle foot orthoses (AFO's) designed to help prevent pressure to the heel. However, not all AFO's are safe and effective for the ambulatory patient at risk for skin breakdown.

Purpose

The purpose of this case report is to determine the safety and effectiveness of heel pressure relieving ankle foot orthoses. Specifically, we selected 5 AFO's using HCPCS code L4396: Ankle Contracture Boot by Deroyal, FootHold With Splint by EHOB, MPO 2000 Active by RCAI, Multi Podus by RCAI and PRAFO by Anatomical Concepts. The following characteristics were assessed: (1) the ability of the product to suspend the heel in order to prevent and treat pressure related heel ulcers, (2) the ability of the product to avoid risk of skin breakdown at the Achilles tendon or other vulnerable areas as the result of improper fit, (3) the ability of the product to allow optimum functional ability in weight bearing, (4) the ease of application of the product, and (5) cost effectiveness.

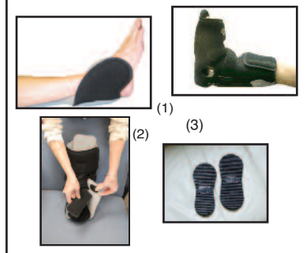
Ankle Contracture Boot
by DeRoyal

- Secure/stable fit allows effective heel suspension
- Easy application of AFO with only two straps (1)
- Company disclaimer does not support use with open wounds
- Material at the base of splint allows the foot to slip laterally during weight bearing interfering with optimal functional performance (2)
- May cause risk of breakdown at Achilles or other vulnerable areas due to the inability to adjust the hard posterior shell size to fit varying calf circumferences (3)
- Post at plantar midfoot provides an uncomfortable weight bearing surface and the potential for falls if the sole is not in the proper position (4)
- Complicated sizing requiring measurement of foot and calf circumference may increase the risk of improper fit



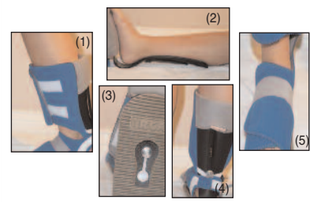
FootHold with Splint
by EHOB

- Hydro-cushion places the ankle and foot in proper position for optimal heel suspension in supine, while protecting the Achilles Tendon from potential breakdown. The ankle wings protect the malleoli in sidelying. (1)
- Breathable material allows optimal temperature balance to avoid heat/moisture build-up that can contribute to skin breakdown
- Easy application of AFO with limited number of straps (2)
- Able to accommodate bulky dressings or compression wraps that may be needed for treatment of LE wounds
- Superior weight bearing surface without bolt allows for unlimited ambulation without lateral sliding (3)
- Dynamic structure of AFO promotes flexibility for a more normal gait pattern
- Straight forward sizing based on shoe size



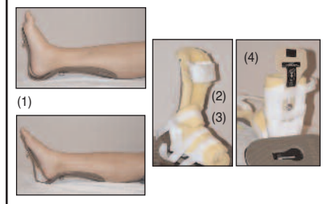
MPO 2000 Active
by RCAI

- Secure fit allows effective heel suspension
- Easy application due to limited number of straps
- "Dorsiflexion Assist" mechanism of AFO allows for flexibility to promote normal gait pattern (1)
- Hard posterior shell places patient at risk for Achilles Tendon breakdown and cannot be adjusted for varying calf circumferences placing vulnerable skin at risk for breakdown (2)
- Post at plantar midfoot causes an uncomfortable weight bearing surfaces and a risk for falls if sole not properly attached (3)
- Posterior anti-rotation bar with large bolt placing opposite leg at risk for skin breakdown (4)
- Dorsal foot strap can cause pressure related skin breakdown if applied too tightly (5)



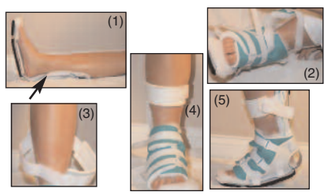
Multi Podus System
by RCAI

- Secure fit allows effective heel suspension
- Hard posterior shell places patient at risk for Achilles Tendon breakdown (1)
- Posterior shell can not be adjusted for varying calf circumferences placing vulnerable skin at risk for breakdown
- Synthetic Sheepskin material can get matted with potential to expose underlying hard shell (2)
- More complicated application due to multiple straps (3)
- Post at plantar midfoot exposed when Velcro sole was removed; puts patient at risk for accidental slippage if not replaced prior to transfers/mobility (4)



PRAFO
by Anatomical Concepts

- Secure, "customizable" fit allows optimal heel suspension even in patients with plantarflexion contractures or issues with spasticity
- Requires custom fitting by an orthotist
- Posterior shell height can be adjusted for varying limb lengths
- Hard posterior shell places patient at risk for Achilles Tendon breakdown and cannot be adjusted for varying calf circumferences placing vulnerable skin at risk for breakdown (1)
- Complicated straps decrease ease of application (2)
- Proximal leg strap can cause a tourniquet effect and breakdown if applied to tightly (3)
- Foot slides laterally in weight bearing (4)
- Very rigid AFO limits dorsiflexion during gait (5)
- Unable to remove sole for clean floor to bed transition



Outcomes

The FootHold With Splint by EHOB was rated the highest in categories 1, 2, 3, and 5. The Ankle Contracture Boot, by DeRoyal was rated the highest in category 4. Our results indicate that the FootHold With Splint by EHOB is the most overall safe and effective heel pressure relieving AFO based on the 5 characteristics important in a patient at high risk for skin breakdown.

Discussion

Although there are many options available for heel pressure relieving ankle foot orthoses, the physical therapist must assess the characteristics of each product to determine the safety and effectiveness specific to preventing pressure related injury to the heel, while maximizing function. Based on the data collected in this case study, not all heel pressure relieving AFO's are equally safe and effective. Clinical reasoning and sound judgment must be used to determine the AFO most appropriate for the patient at risk for skin breakdown

Special thanks to Advanced OrthoPro, Inc. (Indianapolis, IN) for the use of their products for this study.

Case Descriptors

In order to determine the safety and effectiveness of each AFO as outlined above, physical therapists trialed each product at home to simulate typical patient usage. Each of the 5 products were ranked with a score of 1 representing the least optimal performance, and a score of 5 representing the most optimal performance for each of the 5 characteristics listed above. The scores were totaled in order to determine which product was the overall most safe and effective heel pressure relieving AFO for the ambulatory high risk individual.

Overall Ranking - Highest to Lowest (Total Number of Points)	(1) Ability of the product to suspend the heel in order to prevent and treat pressure related heel ulcers	(2) Ability of the product to avoid risk of skin breakdown at the Achilles Tendon or other vulnerable areas as a result of improper fit	(3) Ability of the product to allow optimum functional ability in weight bearing	(4) Ease of application of the product	(5) Cost effectiveness
FootHold with Splint, by EHOB (23)	5	5	5	3	5
Ankle Contracture Boot, by DeRoyal (14)	1	3	1	5	4
MPO 2000 Active, by RCAI (14)	3	2	3	4	2
Multi Podus System, by RCAI (13)	2	4	2	2	3
PRAFO, by Anatomical Concepts (11)	4	1	4	1	1