The Richie Brace® Ultra: Offering a Step-Down Approach to Ankle-foot Orthotic Therapy

INTRODUCTION

The Richie Brace® Ultra is a custom fabricated ankle-foot orthosis which incorporates medial and lateral limb supports articulating with a balanced orthotic footplate. The brace also includes a pre-tibial shell which is custom fabricated and provides a rigid overlapping interlocking anterior tibial control extending from the tibial tuberosity to the medial and lateral malleoli of the ankle joint.

BIOMECHANICS AND CLINICAL INDICATIONS

The unique design of the Richie Brace® Ultra provides two specific biomechanical functions. The medial/lateral orientation of the limb uprights, secured with rigid straps tightly opposed to the soft tissue of the lower leg provides restriction of translational motion of the ankle joint and subtalar joint. (1) Abnormal translational motion around the ankle joint complex is seen when there is ligamentous disruption which is commonly found in the adult acquired flatfoot (PTTD) and with degenerative joint disease (DJD). (2)

The pre-tibial shell of the Richie Brace® Ultra is designed to off-load the ankle, subtalar and midfoot joints by transferring axial load to the medial and lateral malleoli and the tibial tuberosity. (3) Axial loading of joints in the lower extremity can contribute to pain and disability when the articular cartilage is damaged or the underlying bony structures become deformed. Axial load has been implicated as a primary deforming force in the progression of posterior tibial tendon dysfunction and other tendinopathies of the ankle. (4,5)

The Richie Brace® Ultra is indicated for the treatment of Adult Acquired Flatfoot (PTTD), Degenerative Arthritis of the Ankle and Hindfoot, Tendon Ruptures and Tendinopathy of the Ankle and Chronic Ankle Instability. With application of dorsi-assist ankle joints, this brace can be modified to treat Dropfoot conditions.

THE STEP-DOWN APPROACH TO ANKLE-FOOT ORTHOTIC THERAPY

Some conditions such as Dropfoot and severe DJD of the Ankle require permanent, lifetime use of ankle foot orthotic therapy. Other conditions such as Adult Acquired Flatfoot, Chronic Ankle Instability and Tendinopathy of the Ankle can be expected to improve with orthotic treatment combined with effective rehabilitation programs. In many cases, patients require a modification of their prescribed ankle-foot orthosis as recovery proceeds. Such modifications provide increased range of motion.
which improves lower limb function to restore mobility. This “step-down” strategy to modify bracing according to patient recovery has been popular in the treatment of spinal conditions, but has yet to be incorporated into lower extremity bracing protocols. (6,7)

Currently, there are six peer-reviewed studies published in the medical literature which document extremely successful treatment of adult acquired flatfoot (PTTD) with ankle-foot orthoses. (8-13) In most of these studies, a significant number of the patients were able to discontinue use of their AFO devices after a year of treatment. Such treatment requires the completion of a specialized rehabilitation program which emphasizes muscular strengthening and improved joint range of motion. (14)

Bracing is a critical component of the treatment program for the acute ankle ligament injuries as well as chronic ankle instability. (15,16) Similarly, the benefits of controlled immobilization is recognized as an important component of treatment of tendon injuries around the ankle. (17) During the initial and intermediate phases of immobilization, a functional rehabilitation program is implemented which emphasizes muscular strengthening, joint range of motion, balance training and activity specific training.

The step-down approach to ankle foot orthotic therapy involves the prescription of a restrictive brace for the initial treatment of the acute phase of injury or pathology. The brace is then modified according to healing and recovery of the patient during the intermediate and final phases. Modifications allow increased joint range of motion to facilitate muscular activity and normalized gait patterns. Gradual increased loading of the injured structures is permitted as bone, joint and soft tissue stabilizers recover and strengthen. Loading is necessary in a controlled fashion to stimulate stronger collagen synthesis for optimal ligament and tendon repair. (17)

In the initial phase of treatment, the Richie Brace® Ultra can be prescribed with features for maximal restriction of motion and off-loading of the foot which would include: Restricted ankle joint pivot, Medial or Lateral Arch Suspender, Pre-tibial shell. (Note: All of the features other than the pre-tibial shell must be prescribed individually by the practitioner) As recovery proceeds and healing occurs, the ankle joints can be converted to free motion, the Arch Suspenders can be removed, and the pre-tibial shell can be removed in various steps according to practitioner discretion. In many cases, the patient will end up using a lower profile, less restrictive brace which has been modified from the original Richie Brace® Ultra version. The beauty of the step-down features of this brace is the fact that the entire treatment program can be managed with one single brace which can be modified as patient recovery progresses.

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SUMMARY

A step-down approach, previously used in spinal injury bracing, can now be incorporated into lower extremity ankle-foot orthotic therapy. The new Richie Brace® Ultra has unique features which allow control of translational motion around the ankle joint complex as well as axial offloading of these joints and surrounding soft tissue structures. Offloading and restriction of joint motion can be modified as patient response to treatment improves, resulting in a less restrictive version of the original Richie Brace® Ultra. The final version of this brace can be implemented without the expense of fabricating a new brace to address the changing medical condition. Ultimately, the patient will be managed with a modified version of the original Richie Brace® Ultra which allows more freedom of movement and restoration of mobility.

REFERENCES


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