Pediatric Partial Foot Prosthesis: A New Treatment Option

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INTRODUCTION

Documentation of pediatric partial foot amputation (PFA), prosthetic intervention, and effectiveness of treatment is insufficient. However, recommendations regarding pediatric prosthetic intervention advise downsizing, sequenced complexity, and a modular design that does not interfere with an increased activity level. In the general population, PFA is the most common amputation surgery with 2 per 1,000 affected. Transmetatarsal or mid-tarsal amputations account for approximately 24% of PFA. In the pediatric population, 40% of amputations are attributed to trauma. Lawn mowers and household accidents account for the majority of the partial foot amputations in the pediatric population. Current pediatric treatment options mimic those for adults with the extent of the intervention proportional to the extent of tissue lost. More recently, it has been recommended that any amputation involving the metatarsal heads or proximal structures requires a prosthetic intervention that extends proximal to the ankle. A prosthetic design for treating the pediatric partial foot amputee that restores gait function by addressing the biomechanics of walking is proposed.

METHODS

A prosthetic design for the partial foot amputee that restores gait function by addressing the biomechanics of walking is proposed. A custom-fit rigid DCC AFO with carbon anterior shell, customized with a toe filler type socket with wedging, lifts, and posting are the components of the proposed prosthesis. Until recently, there was not a custom-fit option for providing a reliable custom-fit rigid DCC structure in which the tested interventions of an anterior shell dynamic carbon composite prosthesis (AKA: KiddieROCKER™) with an incorporated custom toe filler socket and a toe filler alone were a new condition for the test subject and she did not have an opportunity beyond walking in the office to accommodate to the introduced interventions. However, we found that she was able to accommodate between each test intervention and ambulate without difficulty. The test subject wearing her high top shoes.

DISCUSSION

Research on specific effects on gait function utilizing the proposed PFA DCC design need to be conducted. Preliminary data regarding use of the DCC AFO in the pediatric population indicates that a dynamic response carbon AFO, similar to the rigid DCC design, provides improved function in running, jumping, and walking performance while Gross Motor Function Measure was also improved. Similar outcomes are expected with a PFA DCC prosthesis due to the similarity of the gross structure and function of the rigid DCC design.

RESULTS

The pediatric prosthetic design is proposed based on the outcomes of the adult treatment option with similar outcomes expected. This prosthetic design has been used with adult PFA patients since 2010 and the anecdotal results are positive. Patients report increased mobility and decreased skin irritation on the medial talus. It is recognized that her normal ambulatory status extends proximal to the ankle.

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DISCLOSURE

Vincent DeCataldo, BOCPO, NJ LPO is employed by Allard USA, manufacturer of dynamic carbon composite AFOs.