

Evaluation the amount of the loads applied on the hip joint complex during walking the normal subjects with a new Reciprocal Gait Orthosis

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Introduction

A variety of orthoses have been design to enable Spinal Cord Injury (SCI) individuals to stand and walk. However, all of them have problems in terms of donning and doffing, efficiency of walking and cosmesis. A new Reciprocal Gait Orthosis (RGO) was designed in order to solve some of the aforementioned problems. Specifically the design allows for easy, independent, donning and doffing by the user; it allows for alignment of the various segments while the user is wearing the orthosis; the modularity of the orthosis allows for easy transportation.

Method

The amount of the loads applied on the foot and crutch, moment around hip joint complex, 'anatomical and mechanical joints', and the loads applied on the orthosis were measured during walking of 5 normal participants with the orthosis. Appropriate strain gauges were inserted on the lateral bar of the orthosis and were calibrated before performing walking tests. The intersegmental moments around the hip joint complex were measured using body builder software.

Results

The mean values of flexion, extension and adduction moments of the hip joint complex were 0.527, 0.404 and 1.126 N.m/kg respectively. Figures 1 and 2 show the moments applied on the hip joint complex during walking with the orthosis.

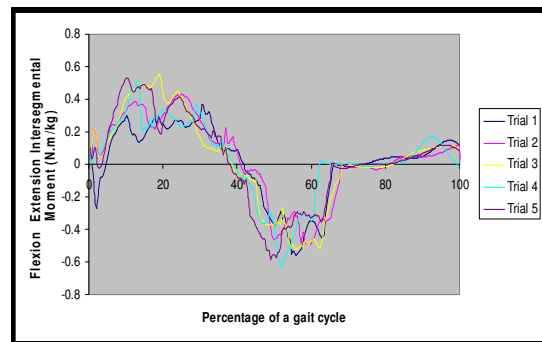


Figure 1: Flexion, extension moment applied on the hip joint complex

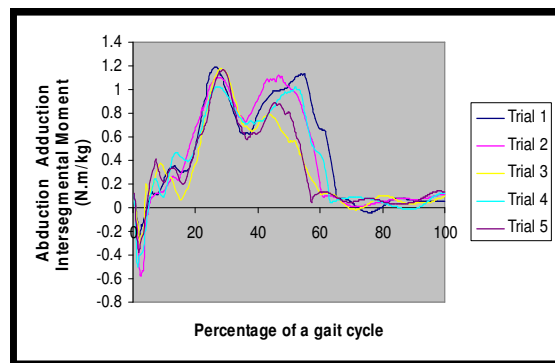


Figure 2: Adduction moment applied on the hip joint complex

The maximum percentages of body weight (BW) applied through the orthosis; crutch and foot were 22.3%, 16.1% and 99% respectively. Those values are higher than expected. Nearly 0.21 and 0.493 N.m/kg extension and adduction moments respectively were transmitted by the lateral bar of the orthosis. Figure 3 shows the adduction moment transmitted through the lateral bar of the orthosis.

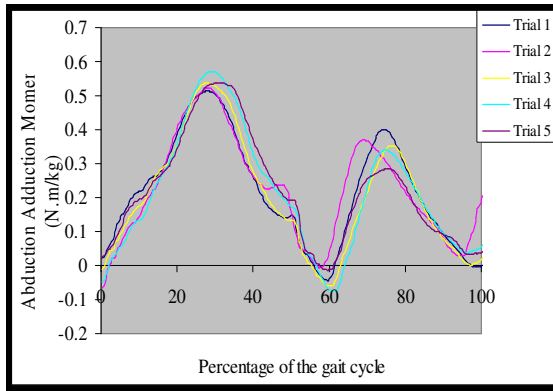


Figure 3: The adduction moment applied on the lateral bar of the orthosis

Conclusion

The forces and moments which applied on the lateral bar of the orthosis during walking the normal subjects with the new RGO orthosis were more than expected. Those values can be utilised for the design of new orthoses.

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