Effectiveness of SWASH orthosis in combination with botulinum toxin type A on gross motor function and prevention of hip displacement in children with cerebral palsy

KAREN DIBENEDETTO, SPT; KRISTINA RUSSO, SPT; ANAHITA SAADAT, SPT, CSCS
DEBRA P. MILLER, PT, DPT, MS; MICHAEL D. ROSS, PT, DHSc, OCS
THE UNIVERSITY OF SCRANTON

INTRODUCTION

The 'Sitting, Walking, And Standing Hip' (SWASH) orthosis places a child in varying degrees of hip abduction in order to limit hip adduction when sitting, standing, and walking to prevent scissoring gait and improve hip alignment. Botulinum toxin type A (BTX-A) injections are used to decrease hip adductor spasticity and improve passive range of hip abduction. Hip displacement, the second most common impairment seen in children with cerebral palsy (CP), is progressive hip subluxation potentially leading to dislocation. When paired with the SWASH orthosis, BTX-A may improve gross motor function and reduce the potential of hip displacement caused by asymmetrical activity of the hip musculature and decreased weight bearing on bones.

PURPOSE

The purpose of this systematic review is to appraise the literature on the use of the SWASH orthosis with BTX-A on gross motor function and the prevention of hip displacement in children with CP.

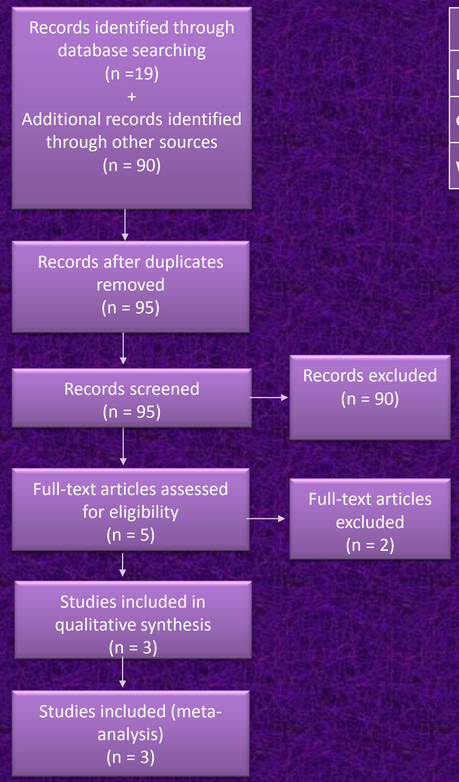
METHODS

A search of 6 databases, including The Cochrane Library, PubMed, PEDro, Wiley Online Library, CINAHL/EBSCO, and Google Scholar, was completed. Search terms included "cerebral palsy," "hip orthosis," "SWASH," "SWASH brace," "Botox," "botulinum toxin," and "botulinum toxin type A." Initial search yielded 109 articles. Three articles met the inclusion criteria of children 2-18 years old with CP, peer-reviewed journals, randomized controlled trials, and hip adductor spasticity. Exclusion criteria included previous hip surgery and upper extremity focus.

RESULTS

Two reviewers independently rated the 3 articles using the PEDro scale. The mean PEDro score was 6.67. The studies included 91 patients (59 male, 32 female; mean age 2.5 years) classified according to the standardized assessment Gross Motor Function Classification Scale (GMFCS) and hip migration percentage. A migration between 10 and 40% classified participants as having "hips at risk". All studies used an intervention group receiving the SWASH orthosis and BTX-A, and a control group receiving current physical therapy management. In the initial study, 39 participants were assessed additionally using the standardized Gross Motor Function Measure (GMFM)-66 scores, and GMFM-88 total and goal scores. This group had improvements in gross motor function; however, outcome comparisons were not statistically significant. In the intermediate study, the weighted mean hip migration difference of 1.4% favored the intervention group, but was not statistically significant. In the final, 10-year follow-up study, 46 (31 males, 15 females) of the 91 participants had a mean hip migration of 15.9% for the intervention group and 15.2% for the control group, showing no statistically significant difference. Forty of the 46 participants required hip surgery.

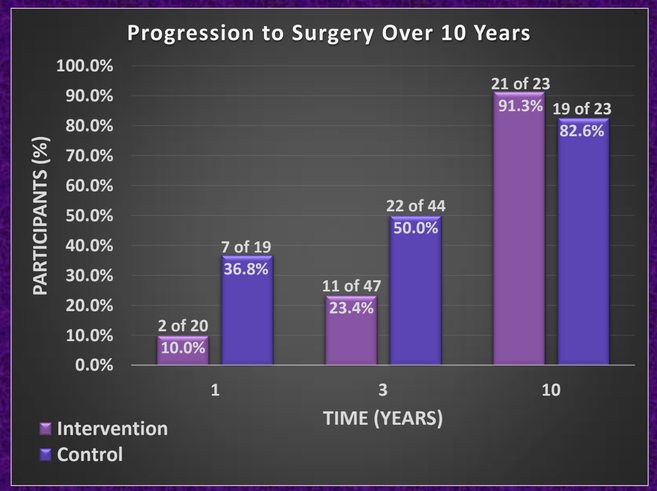
PRISMA



Quality Assessment

Author	Study Design	Sackett Level	PEDro Score
Boyd et. al. (2001)	RCT	1B	7/10
Graham et. al. (2008)	RCT	1B	7/10
Willoughby et. al. (2012)	RCT	1B	7/10

Participant Progression to Surgery



CONCLUSIONS

Reports of a timeline and need for surgery were consistent across the three studies. Short-term use of the SWASH orthosis and BTX-A produced small improvement in the progression of hip displacement, prolonging the time to surgery in children with GMFCS levels II and III. Follow-up at 10 years showed no statistical reduction in the need for surgery or enhancement of hip development in either group.

CLINICAL RELEVANCE

The SWASH orthosis in conjunction with BTX-A lacks evidence for long-term use to improve gross motor function, reduce need for surgery, or enhance the morphology of hip development in children with CP. Further research is needed with larger cohorts to evaluate the efficacy of the SWASH orthosis and BTX-A on gross motor function and the prevention of hip displacement in children with CP

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