

# The Effect of the GivMohr Sling on Gait Parameters Post Stroke

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## Background

The role of the upper extremity (UE) during gait has been well documented, and it has been demonstrated that inhibiting arm swing in normal subjects has a negative effect on energy expenditure and induces abnormal muscle activation in the trunk and lower extremities. In addition, research has shown that in subjects who have sustained a stroke, wearing a single strap sling improves gait, but this type of sling may decrease function of the UE. Normalization of movements of the UE may enhance movements of the trunk, pelvis, and lower extremity while walking; including increasing walking speed and weight bearing on the paretic side.

### The GivMohr Sling

The GivMohr sling is designed to position the low tone UE appropriately while providing joint compression through the glenohumeral joint, elbow and wrist. The sling holds the UE in a functional position consisting of retraction and depression of the scapula, with the humerus in near neutral rotation, and the elbow held in mild flexion. This position leaves the involved UE free to swing and provide counterbalance weight shifting in the upright position.



### The Purpose/Research Question

To determine if wearing the GivMohr Sling results in a change in gait parameters:

Spatial parameters of gait such as stride length or step length

Temporal parameters such as velocity, single support or double limb support time

## Methods

Twenty-two adults (mean age 57 range 27-76) who had sustained a cerebral vascular accident which resulted in hemiparesis walked (with an assistive device as needed) across the GAITRite mat up and back, with and without the GivMohr sling in a randomly assigned order. Subjects walked at a self-selected speed with standby assist for safety.



## Findings

Variables	Least Squares Mean/SE	Range Min, Max	p-value
<b>Ambulation Time</b>			
Walk with sling	20.5 (2.5)	(4.5, 53.8)	0.07
Walk without sling	21.9 (2.5)	(5.0, 51.2)	
<b>Velocity</b>			
Walk with sling	25.1 (3.6)	(6.8, 81.7)	0.01
Walk without sling	23.1 (3.2)	(6.4, 74.7)	
<b>Stride Length Involved Side</b>			
Walk with sling	59.4 (3.4)	(33.0, 103.3)	0.02
Walk without sling	56.4 (3.2)	(31.8, 94.4)	
<b>Stride Length Uninvolved</b>			
Walk with sling	59.6 (3.5)	(33.3, 105.0)	0.01
Walk without sling	56.6 (3.3)	(31.5, 95.4)	
<b>Cycle Time Involved Side</b>			
Walk with sling	2.88 (0.26)	(1.23, 5.77)	0.20
Walk without sling	2.96 (0.26)	(1.26, 5.86)	
<b>Cycle Time Uninvolved Side</b>			
Walk with sling	2.91 (0.26)	(1.22, 5.64)	0.65
Walk without sling	2.94 (0.26)	(1.24, 6.15)	

## Discussion

This study demonstrated a statistically significant increase in gait velocity in subjects wearing the GivMohr sling. The velocity of gait is one primary predictor of functional ambulation, with .80 m/sec or greater needed for community ambulation. In addition, velocity is related to discharge location, falling, and quality of life. A change of as small as .05 m/sec has been shown to be clinically significant.

The subjects in this study were less than 8 months post stroke and were either in or outpatients at a local rehabilitation facility. All but 2 of the subjects' velocity was at .42 m/sec or below which is classified as household ambulation. The majority of these individuals were very slow ambulators with and without the sling, but still demonstrated an increase in speed while wearing the sling. This is a remarkable finding considering each subject walked on average 4 times across the mat in less than 10 minutes time.

## Clinical Relevance

The GivMohr Sling is a simple and inexpensive treatment that not only supports and protects the UE, but properly positions it during upright postures. Early gait and balance training in subjects with low tone UE's is often difficult and may be delayed. Proper support and positioning of the UE allows earlier, safe upright activities.

If just adding a sling can help to normalize gait and improve velocity, these activities may be initiated sooner in the rehabilitation process. This could potentially decrease length of stay, while enhancing the possibility of discharge to home. The long term functional outcomes and quality of life of individuals post stroke may be improved.

### Future study

Further analysis of the data, including other variables as well as individual data and small group data will take place. One subject was measured 2 separate times 4 months apart (second data not included here) and demonstrated a change in velocity from .256 m/sec to .655 m/sec without the sling and .265 m/sec to .690 m/sec with the sling. This subject's data will be analyzed to determine important contributing variables.

## Support

Funding for the research conducted was provided by the Neuro-Developmental Treatment Association, Inc., a non-profit corporation which promotes the effective treatment of certain neurological disorders by utilization of the Bobath Neuro-Developmental Treatment Approach.