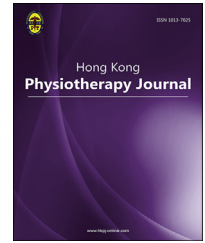




Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.hkpj-online.com



RESEARCH REPORT

Effectiveness of robotic-assisted gait training in stroke rehabilitation: A retrospective matched control study



Bryan Ping Ho Chung, MSc in Health Care*

Physiotherapy Department, Tai Po Hospital, Tai Po, New Territories, Hong Kong

KEYWORDS

gait;
physiotherapy;
rehabilitation;
robotic;
stroke

Abstract Objective: This study aimed to evaluate the effectiveness of robotic-assisted gait training (RAGT) in improving functional outcomes among stroke patients.

Design: This was a retrospective matched control study.

Setting: This study was conducted in an extended inpatient rehabilitation centre.

Patients and intervention: There were 14 patients with subacute stroke (4–31 days after stroke) in the RAGT group. Apart from traditional physiotherapy, the RAGT group received RAGT. The number of sessions for RAGT ranged from five to 33, and the frequency was three to five sessions per week, with each session lasting for 15–30 minutes. In the control group, there were 27 subacute stroke patients who were matched with the RAGT group in terms of age, days since stroke, premorbid ambulatory level, functional outcomes at admission, length of training, and number of physiotherapy sessions received. The control group received traditional physiotherapy but not RAGT.

Outcome measures: Modified Functional Ambulation Category (MFAC), Modified Rivermead Mobility Index (MRMI), Berg's Balance Scale (BBS), and Modified Barthel Index (MBI) to measure ambulation, mobility, balance, and activities of daily living, respectively.

Results: Both RAGT and control groups had significant within-group improvement in MFAC, MRMI, BBS, and MBI. However, the RAGT group had higher gain in MFAC, MRMI, BBS, and MBI than the control group. In addition, there were significant between-group differences in MFAC, MRMI, and BBS gains ($p = 0.026$, $p = 0.010$, and $p = 0.042$, respectively). There was no significant between-group difference ($p = 0.597$) in MBI gain ($p = 0.597$).

Conclusion: The results suggested that RAGT can provide stroke patients extra benefits in terms of ambulation, mobility, and balance. However, in the aspect of basic activities of daily living, the effect of RAGT on stroke patients is similar to that of traditional physiotherapy.

Copyright © 2016, Hong Kong Physiotherapy Association. Published by Elsevier (Singapore) Pte Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

* Corresponding author. Physiotherapy Department, Tai Po Hospital, 11 Chuen On Road, Tai Po, New Territories, Hong Kong.
E-mail address: taipobryan@yahoo.com.

Introduction

Stroke, also known as cerebrovascular accident, is an acute disturbance of focal or global cerebral function, with signs and symptoms lasting more than 24 hours or leading to death, presumably of vascular origin [1]. In Hong Kong, around 25,000 stroke patients are admitted to public hospitals under the Hong Kong Hospital Authority annually [2]. Although mortality and morbidity among stroke patients have declined due to medical advances, impacts on stroke survivors and community remain significant. The most widely recognized impairment caused by stroke is motor impairment, which restricts muscle movement or mobility function [3]. Many stroke patients experience difficulties in walking, and improving walking is one of the main goals of rehabilitation [4]. Since it was shown that the process of spontaneous recovery is almost completed within 6–10 weeks [5], early rehabilitation is essential to maximize the function of patients after stroke. Recent evidence suggests that high-intensity repetitive task-specific practice might be the most effective principle when trying to promote motor recovery after stroke [3]. Robotic-assisted gait training (RAGT) is a new global physiotherapy technology that applies the high-intensity repetitive principle to improve mobility of patients with stroke or other neurological disorders. The advantage of RAGT may be the reduction of the effort required by therapists compared with treadmill training with partial bodyweight support, as they no longer need to set the paretic limbs or assist in trunk movements [6]. People who receive electromechanical-assisted gait training in combination with physiotherapy after stroke are more likely to achieve independent walking than people who receive gait training without these devices [7]. More specifically, people in the first 3 months after stroke and those who are not able to walk seem to benefit most from this type of intervention [7]. Evidence also shows that the use of RAGT in stroke patients has positive effects on their balance [8].

Randomized controlled trials and systemic reviews have demonstrated the effectiveness of RAGT for stroke patients in terms of functional outcomes such as walking ability [9–11] and balance [8,11]. However, limited published evidence is available on the effectiveness of RAGT in improving other functioning activities such as basic activities of daily living (ADL) [12,13]. If RAGT can improve walking ability and balance of stroke patient, can RAGT also improve basic ADL of stroke patients? The hierarchical pattern of progression in basic ADL is in the following order: bathing, dressing, transferring, toileting, controlling continence, and feeding, with bathing being the most complex task and feeding the least [14]; however, walking ability and balance contribute to parts of basic ADL. Moreover, factors that make the greatest contribution to ADL after stroke were found to be balance, upper extremity function, and perceptual and cognitive functions [15]. If RAGT can improve ADL of stroke patients, which of the above factors is/are enhanced by RAGT? Can RAGT also enhance perceptual and cognitive functions of stroke patients? Hence, controlled studies are necessary to address these research questions. A retrospective study conducted by Dundar et al [13] investigated the effect of robotic training in functional independence

measure and other functional outcomes of patients with subacute and chronic stroke. However, the study concluded that combining robotic training with conventional physiotherapy produced better improvement than conventional physiotherapy in terms of functional independence measure, but not walking status or balance. The result was opposite to the specificity of training principle [16] that gait training should produce more positive effect for walking and balance than ADL. Hence, this study intends to investigate the effectiveness of RAGT in improving functional mobility and basic ADL for stroke patients, and hopefully can lead to further randomized controlled studies to investigate the impact of RAGT on basic ADL.

Methods

Patient selection

All stroke patients admitted to Tai Po Hospital, Tai Po, Hong Kong from 1 January 2014 to 31 December 2015 were screened by physiotherapists for RAGT. Inclusion criteria were independent outdoor walking before the episode of stroke, ability to follow one-step command, ability to tolerate passive standing for at least 15 minutes, and the interval between the stroke and the first session of intervention being no longer than 6 weeks. Exclusion criteria were femur length shorter than 35 cm or longer than 47 cm; body weight greater than 135 kg; severe lower-extremity contractures, spasticity, ataxia, or dyskinesia that limited normal walking kinematics; open wound over trunk or lower limbs; hemodynamic instability; and other active medical illness.

Baseline characteristics

Baseline characteristics of the patients, including age, gender, days from stroke, number of physiotherapy sessions received, and length of training, were collected for further analysis. The length of training of a patient was defined as the total number of days from the start to the end of physiotherapy.

Study design

This was a retrospective case–control study. The investigator of this study reviewed medical records, physiotherapy treatment records, and data, from the Clinical Management System of Hong Kong Hospital Authority, of all patients who had received stroke rehabilitation in Tai Po Hospital during the period from 1 January 2014 to 31 December 2015. The patients who had received more than four RAGT sessions were assigned to the RAGT group. The patients who had completed the stroke rehabilitation programme without RAGT were selected for matching with the RAGT group in terms of age, premorbid ambulatory level, day from stroke, length of training, number of physiotherapy sessions, and admission functional outcome measurements. After excluding the patients who were not matched with the RAGT group, the remaining patients were assigned to the control group. Both groups had similar baseline characteristics such as period of hospitalization, days from stroke, and

Download English Version:

<https://daneshyari.com/en/article/5563845>

Download Persian Version:

<https://daneshyari.com/article/5563845>

[Daneshyari.com](https://daneshyari.com)