Convention ID: 174
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Robotic-assisted locomotor training can provide extra functional benefits for stroke rehabilitation patients: a retrospective matched control study
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Keywords:
stroke
physiotherapy
rehabilitation
robotic
walking
neurological

Introduction
Robotic-assisted locomotor training is a new global physiotherapy technology to improve walking ability of patients who have conditions like stroke or other neurological disorders. Physiotherapy Department of Tai Po Hospital started to use Lokomat Pro (Hocoma Inc., Zurich, Switzerland) to provide the robotic-assisted locomotor training for patients since 2014.

Objectives
The objective is to evaluate the effectiveness of robotic-assisted locomotor training on functional outcomes of stroke rehabilitation patients.

Methodology
This was a retrospective case-control study compared functional outcomes including walking ability, balance and basic activities of daily living (ADL) of stroke patients in treatment group (Group A) to a matched control group (Group B). Both groups have received physiotherapy treatment 5 days a week but only Group A have received at least 5 sessions of robotic-assisted locomotor training by Lokomat Pro (Hocoma Inc., Zurich, Switzerland) operated by physiotherapists. Both groups were hospitalized in Tai Po Hospital within the period from January 2014 to December 2015, suffered from sub-acute stroke (within 2 months after stroke) and could walk outdoor independently before this episode of stroke. The functional outcome measurements were Modified Functional Ambulation Category (MFAC), Modified Rivermead Mobility Index (MRMI), Berg's Balance Scale (BBS) and Modified Barthel Index (MBI).

Result
From January 2014 to December 2015, there were 26 stroke patients received robotic-assisted locomotor training and 12 of them were excluded from the study since they had less than 5 sessions of robotic-assisted locomotor training. The remained 14 stroke patients (10 male, 4 female, mean age 59.29 ± 6.12) were

recruited to Group A with mean robotic-assisted locomotor training session of 13.00 ± 8.91 (from 5 to 33 sessions). Group B had 27 patients (13 male, 14 female, mean age 60.53 ± 6.58). The premorbid ambulatory level of both groups were independent outdoor walker (MFAC =7). The age, admission functional outcomes (MFAC, MRMI, BBS and MBI) of both groups was no significant difference ($p<0.05$) that indicated both groups were homogeneous upon admission. During hospitalization, the length of training and number of physiotherapy gymnasium session of both groups had no significant difference ($p<0.05$). When comparing the baseline and pre-discharge functional outcomes of both groups, they all had significant improvement in MFAC, MRMI, BBS and MBI ($p<0.05$). The percentage changes in all functional outcomes of Group A were higher than those of Group B. In addition, the gain in MFAC, MRMI, BBS of Group A had significant differences ($p< 0.05$) from those of Group B (MFAC gain: $p=0.026$, MRMI gain: $p=0.010$, BBS gain: $p = 0.042$). Although percentage change in MBI of Group A (51.47%) is higher than Group B (36.56%), the MBI gain between Group A and Group B had no significant difference ($p=0.597$). The results suggested that robotic-assisted locomotor training can provide extra benefits for stroke rehabilitation patients in terms of walking ability and balance but not activities of daily living.