INTRODUCTION
Individuals with unilateral transfemoral amputation (UTFA) commonly experience abnormal gait patterns such as gait asymmetry. Although prescription of a prosthetic limb allows them to regain walking ability, appropriate gait training is necessary to recover their functional walking capacity. However, there has been no established gait training method for people with UTFA in the literature. Recent studies suggest that gait training using a split-belt treadmill could be a possible approach to help recover symmetry of gait pattern. In this case report, we present a novel gait training program using a split-belt treadmill that improves gait symmetry in people with UTFA.

METHOD
A person with congenital right TFA (32 year-old female; body mass index of 16.5) participated in this study. She utilized a suction socket prosthesis with Total Knee and Talux foot. The subject underwent a 30-minute gait training using a split-belt treadmill. The training session consisted of three 10-minute bouts with 2 minutes break between each bout. The subject’s sound leg which had shorter step length at the baseline walking test, was placed on the fast belt and the prosthetic leg on the slow belt during training based on the Reisman and colleagues’ approach (Reisman et al., 2009). The subject’s comfortable walking was measured before training (baseline), immediately after completion of training (post-training) and after 10 minutes of additional over-ground walking (retention) using the GAITRite Walkway System. Symmetry indices of spatiotemporal gait variables (e.g., step length and swing phase of the gait cycle) were calculated to assess change in gait symmetry over three testing periods (Herzog et al., 1989). Symmetry Index (%) = [(prosthetic side – sound side)/ 0.5 (prosthetic side + sound side)] x 100

RESULTS
The subject showed 8.1% longer step length and 16.3% longer swing phase of the gait cycle with her prosthetic leg at the baseline test. The subject’s walking pattern was noticeably changed at the post-training test, showing increased symmetry of step length and swing phase (2.9% and 12.1% longer with the prosthetic leg, respectively). In particular, the first trial of the post-training test clearly indicates that an adapted gait pattern on the treadmill was carried over to over-ground (see Figure 1). However, the degree of adaptation decreased gradually over time and disappeared at the retention test.

DISCUSSION
This case report shows that a person with UTFA could adapt a symmetric gait pattern through gait training with a split-belt treadmill. The adapted gait pattern during treadmill training was transferred to over-ground walking although the adaptation lasted only for short period of time. However, it is still surprising that gait symmetry improved only after 30-minute of training. This result indicates that gait training with a split-belt treadmill may be a potential training method to improve gait symmetry in people with UTFA. The diminished adapted symmetric pattern over a short period may be due to limited training time (30 minutes). Thus, additional study needs to be conducted to identify if long-term gait training using a split-belt treadmill can enhance adapting/learning gait symmetry. This case report suggests that developing an efficient gait training program is essential for people with unilateral amputation to improve walking ability.

CONCLUSION
A novel gait training program using a split-belt treadmill may be an efficient training method to improve gait symmetry in people with UTFA.

CLINICAL APPLICATIONS
Split-belt treadmill training may facilitate regaining gait symmetry in people with UTFA.

REFERENCES