IDENTIFYING THE CORRELATIONS OF OPERATIVE HIP STRENGTH AND RANGE OF MOTION WITH NON-OPE Ratve: Primary Unilateral Total Hip Arthroplasty: A Pilot Study

T Burgess1, C Armstrong1, S Fleming1, K Foley1, A Singh1, S Robarts2, D Kennedy2, J Golish, K Zabjek1

1 Department of Physical Therapy, University of Toronto, Toronto, Ontario, k.zabjek@utoronto.ca
2 Holland Orthopaedic & Arthritic Centre of Sunnybrook Health Sciences Centre, Toronto, Ontario Canada

INTRODUCTION
Osteoarthritis (OA), is one of the most common degenerative diseases in older adults. When conservative treatment fails, OA accounts for 81% of Total Hip Arthroplasties (THA) [1]. Unfortunately, some individuals can be left with short or long-term physical impairments such as muscle weakness, stiffness and abnormal gait patterns [2-4]. Currently, there is a lack of knowledge regarding whether these impairments post-THA can predispose individuals to a greater risk of falling. The primary objective of our study was to examine operative hip abductor and extensor strength, ROM and non-operative toe clearance while walking and the associations between these variables in individuals three to 15 months post-THA. It was hypothesized that hip abductor and extensor strength, and hip ROM of the operative limb would have a moderate positive relationship with non-operative limb toe clearance.

METHODS
Twelve adults post-primary THA were recruited to participate in this study (age: 69±5 years; sex: 8 female). Each participant underwent an assessment for hip flexor and extensor muscle strength, range of motion (ROM) and gait. For the gait assessment, participants were requested to walk along a straight path for approximately 3 meters with and without an obstacle. Obstacle height was calculated as 8% of the participants leg length. While walking, a motion capture system recorded the 3D displacement of 31 reflective markers located on the upper and lower body segments (7 Hz low dual low pass Butterworth filter). Toe clearance was calculated as the distance (mm) between the marker on the obstacle and the marker on the hallux directly vertical over the obstacle. (See Figure 1)

RESULTS
The ROM and strength of the hip abductors and adductors for the participants in this study are presented in Table 1. Participants walked at a speed of 1006 ±152 mm/sec without an obstacle in the travel path, that significantly decreased to 841±170 mm/sec with an obstacle. (p<0.05) The mean toe clearance over the obstacle was 125±27mm. Initial correlation of ROM and strength demonstrated a weak and non-significant correlation with toe clearance. However, upon removal of two outliers that had clinically important pelvic obliquity, the correlation of toe clearance of the non-operative limb with peak hip abductor and extensor strength increased, and displayed a trend towards a weak negative correlation. (r= -.53, r=-.48 respectively; (See Figure 2,3).

DISCUSSION & CONCLUSIONS
The participants in this study exhibited a slower walking velocity and decreased hip ROM and strength in relation to able bodied adults. With the removal of participant’s with an existing clinically significant pelvic obliquity, there was a trend towards a negative correlation between both hip abductor and extensor strength with toe clearance. This emerging trend reveals the importance of further expanding this study to a larger cohort of individuals post THA. Future research that investigates the persistence of these deficits and their association with fall risk will help inform and guide clinical practice post THA.

REFERENCES

Table 1: Active-Assisted Hip range of motion (ROM), and strength measured with a standardized clinical protocol.

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<thead>
<tr>
<th>ROM (°)</th>
<th>Peak Force Normalized for Weight (N/kg)</th>
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<tr>
<td></td>
<td>Flexion</td>
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<tr>
<td>Mean</td>
<td>118.1</td>
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<tr>
<td>Std. Deviation</td>
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