doi: 10.2490/prm.20250007 Progress in Rehabilitation Medicine 2025; Vol. 10, 20250007

ORIGINAL ARTICLE

Fatty Infiltration of Muscles Influences Short-term Walking Speed after Primary Total Hip Arthroplasty

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Objectives: This study aimed to determine the relationship between preoperative fatty infiltration of the lower extremity muscles and walking speed at 2 weeks after total hip arthroplasty (THA). **Methods:** This was a single-institution retrospective cohort study. Participants in this study were patients undergoing primary THA. Fatty infiltration in each muscle (bilateral psoas major, gluteus maximus, gluteus medius, gluteus minimus, quadriceps, and triceps surae) was assessed using non-contrast X-ray computed tomography images obtained during a detailed preoperative examination. The outcome of this study was the normal comfortable walking speed at 2 weeks after THA. Decreased walking speed was defined as less than 0.8 m/s (non-decreased group, coded 0; decreased group, coded 1). Multivariate logistic regression analysis was used to analyze the relationship between fatty infiltration of each skeletal muscle and walking speed. **Results:** A total of 168 participants were included in the analysis. On the operative side, the analysis identified fatty infiltration of the gluteus medius (odds ratio, 0.95; 95% confidence interval, 0.91–0.99) as a determinant of decreased walking speed after THA. On the nonoperative side, the analysis identified fatty infiltration of the quadriceps (odds ratio, 0.91; 95% confidence interval, 0.83–0.99) as a determinant of decreased walking speed after THA. **Conclusions:** In patients undergoing THA, increased fatty infiltration of the gluteus medius on the operative side and the quadriceps on the nonoperative side were associated with decreased walking speed at 2 weeks postoperatively.

Key Words: fatty infiltration; postoperative walking speed; total hip arthroplasty

INTRODUCTION

For patients undergoing total hip arthroplasty (THA), the maintenance of walking speed after surgery is an important consideration in maintaining health status and quality of life. A systematic review on gait function in patients who have undergone THA has demonstrated that their walking speed is significantly decreased when compared with healthy older adults.[1] Generally, decreased walking speed is associated with adverse outcomes, including falls, frailty, institutionalization, cognitive decline, and mortality.[2] Therefore, to extend healthy life expectancy and prevent adverse outcomes in patients who have undergone THA, it is crucial that walking speed-associated factors are identified and appropriate interventions are implemented.

Fatty infiltration of the muscles is a key predictor of

Received: December 10, 2024, Accepted: March 2, 2025, Published online: March 15, 2025
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decreased walking speed in patients who have undergone THA, and previous studies have shown the relationship between fatty infiltration and walking speed.[3–6] Fatty infiltration of the muscles represents an increase in non-contractile tissues within the skeletal muscle, which has been suggested to decrease muscle strength and torque generation rate, reducing the ability to produce rapid muscle contraction.[3] A cross-sectional study in healthy older adults demonstrated the association between increased fatty infiltration of the quadriceps muscle and decreased walking speed.[4] In addition, in patients with preoperative end-stage hip osteoarthritis (OA) and in patients with long-term follow-up after THA, increased fatty infiltration of the muscles around the hip joint is associated with decreased walking speed.[5,6] Therefore, in patients awaiting THA, evaluating the extent of muscular fatty infiltration and implementing appropriate interventions may help prevent decreased postoperative walking speed.

Currently, there is limited evidence on the association between preoperative fatty infiltration of muscle and short-term postoperative walking speed in patients who have undergone THA. A previous study has reported no correlation between preoperative fatty infiltration of the psoas major muscle and walking speed at discharge (mean hospital stay: 18 days) in patients that underwent THA.[7] However, another study showed that patients with hip OA generally showed fatty infiltration in the lower extremity muscles, including the gluteus, quadriceps, and triceps surae,[8] which may also affect walking speed after THA. Therefore, to accurately elucidate the relationship between preoperative fatty infiltration of muscles and short-term postoperative walking speed after THA, a comprehensive evaluation of several lower extremity muscles is imperative.

This study examined the relationship between preoperative fatty infiltration of the lower extremity muscles and walking speed at 2 weeks after THA. According to a nationwide Japanese in-hospital administrative database, the typical hospital stay after THA in in Japan is 2–3 weeks.[9] Furthermore, walking speed at discharge has been demonstrated to forecast long-term motor function.[10] Therefore, to improve long-term outcomes, healthcare providers should increase efforts to identify patients at a risk of delayed walking speed recovery at 2 weeks after THA. This study aimed to clarify the effects of preoperative fatty infiltration of the lower extremity muscles on walking speed at 2 weeks after THA.

MATERIALS AND METHODS

Ethical Statement

This study was approved by the Ethics Committee for Clinical Research of Kawasaki Medical School Hospital (approval number: 5515–01). All participants provided written informed consent prior to their involvement. The study was conducted in accordance with the guidelines of the Declaration of Helsinki.

Study Design and Setting

This was a retrospective cohort study investigating the relationship between preoperative fatty infiltration of the lower extremity muscles and walking speed at 2 weeks after THA. This study was conducted at a single institution in Japan. The inclusion period for this study was from January to December 2022.

Participants

The following inclusion criteria were used for participants: (1) diagnosis of hip OA, (2) primary THA, and (3) older than 40 years of age. The following exclusion criteria were used: (1) non-Japanese nationality, (2) osteonecrosis of the femoral head, (3) Crowe's classification III or IV, and (4) post-THA complications (e.g., prosthesis dislocation, fracture, or nerve damage). Different races have varying characteristics of fatty infiltration of the skeletal muscles.[11] Our study was conducted in Japan, and it was assumed that most participants that underwent THA during the study period would be Japanese. Therefore, participants of other nationalities were excluded. It is known that patients with femoral head osteonecrosis may show combined lower extremity muscle weakness because of underlying disease or as an effect of steroid administration.[12] Therefore, patients with femoral head osteonecrosis were excluded from this study because the characteristics of fatty infiltration of the muscles may also differ between patients with femoral head osteonecrosis and those without.

Postoperative Protocol

During the study period, six experienced surgeons (median experience, 20 years; range, 10–35 years) performed THA. At our institution, the posterolateral approach involves the deliberate detachment of the short external rotators to optimize hip joint exposure. There is a variable risk of injury to the gluteus medius, gluteus minimus, and gluteus maximus based on the patient-specific anatomy and complexity of the procedure. In contrast, the anterolateral approach is generally muscle-sparing. In most cases, there is no significant muscle injury. However, minor damage to the gluteus medius may occur because of retraction or anatomical variations. After THA, rehabilitation was performed with the expectation of discharge after 2–3 weeks in the absence of specific perioperative complications (e.g., periprosthetic fractures or irreversible nerve injury). The rehabilitation objective was to enable patients to achieve stable ambulation with a cane approximately 2 weeks post-THA. To achieve this, patients were exposed to a comprehensive and structured rehabilitation protocol. Progressive gait training was performed with cautious monitoring of patient pain levels, particularly focusing on ensuring proper weight distribution, step length, and postural alignment. Concurrently, muscle-strengthening exercises targeted the hip abductors, quadriceps, and other key lower extremity muscle groups. Range-of-motion exercises were also integrated to enhance hip flexion and extension. Physical therapy sessions were conducted five or six times per week, lasting 40–60 min per session, during which the intensity and complexity of the exercises were progressively adjusted based on patient tolerance and recovery trajectory.

Outcome

The primary outcome of this study was walking speed at 2 weeks after THA. To measure walking speed, participants were instructed to walk at their normal comfortable speed. They were allowed to use a cane as needed to compensate for instability while walking. Walking speed was measured on an 11-m straight walking path with markers at 3 m from each end.[13] Timing to measure walking speed began when a participant's lower limb crossed the start line (the end of the first 3-m preliminary path) and ended when the patient crossed the end line (line separating the end of the 5-m path and the second 3-m path). Walking speed (m/s) was calculated as 5 m divided by the recorded time. Walking speed was measured twice, and the average speed was used for analysis. A previous study has reported that walking speed measurement is sufficiently reliable.[13] Walking speed data were recorded in each participant's medical record and were extracted for this study. We used 0.8 m/s as a criterion to identify participants with decreased walking speed (non-decreased group, coded 0; decreased group, coded 1). A previous study has demonstrated that walking speeds below this threshold are associated with increased fall risk, thus validating its significance.[14]

Exposures

Fatty infiltration in each muscle was assessed using non-contrast X-ray computed tomography (CT) images (Aquilion Prime SP; Canon Medical Systems, Otawara, Japan) obtained during a detailed preoperative examination. All images were obtained within 1 month before THA. CT was performed at a 1.0-mm slice thickness (125 kV, 370 mA). To ensure measurement consistency, the CT system was routinely calibrated, with water set to 0 and air to −1000, using a phantom provided by the manufacturer. The following skeletal muscles were assessed: bilateral psoas major, gluteus maximus, gluteus medius, gluteus minimus, quadriceps, and triceps surae (**Fig. 1**). The psoas major muscle was assessed at the mid-level of the L3 vertebra.[15] The gluteus maximus, gluteus medius, and gluteus minimus were assessed at the level of the lower end of the sacroiliac joint.[8] The quadriceps was assessed at the midpoint between the apex of the greater trochanter and the knee joint.[4] The triceps surae was assessed in the proximal third between the knee joint and the talocrural joint.[8] The contour of each muscle was manually traced as a region of interest and analyzed using OsiriX image analysis software (Lite version 10.0.2; Pixmeo, Geneva, Switzerland). An experienced physical therapist performed all measurements. The mean CT value (Hounsfield units) within the region of interest was used as an indicator of fatty infiltration in the skeletal muscles. A low CT value of the skeletal muscle indicates a significant fat accumulation within the tissue, reflecting decreased muscle quality.[16] Before measurement, 20 participants were randomly selected to calculate the examiner's intraclass correlation coefficient [ICC (1.1)]. The intra-rater reliability ICC (1.1) for the measurement of CT values of the skeletal muscle was 0.90–0.94.

Potential Confounders

Data regarding age, sex, body mass index (BMI), operative side hip condition (hip OA severity and degree hip subluxation), other musculoskeletal diseases, medical comorbidities, and surgical approach were collected from the medical charts at the time of admission. The hip OA severity was graded preoperatively using the Kellgren and Lawrence system.[17] In addition, we assessed patients for the presence or absence of other musculoskeletal diseases, including hip OA on the nonoperative side, knee OA, spinal diseases, and history of total joint arthroplasty. Medical comorbidities were assessed using the modified Charlson Comorbidity Index (CCI). The modified CCI is an externally validated index that adjusts the score weight for the presence and severity of each condition.[18] The surgical approaches employed in our

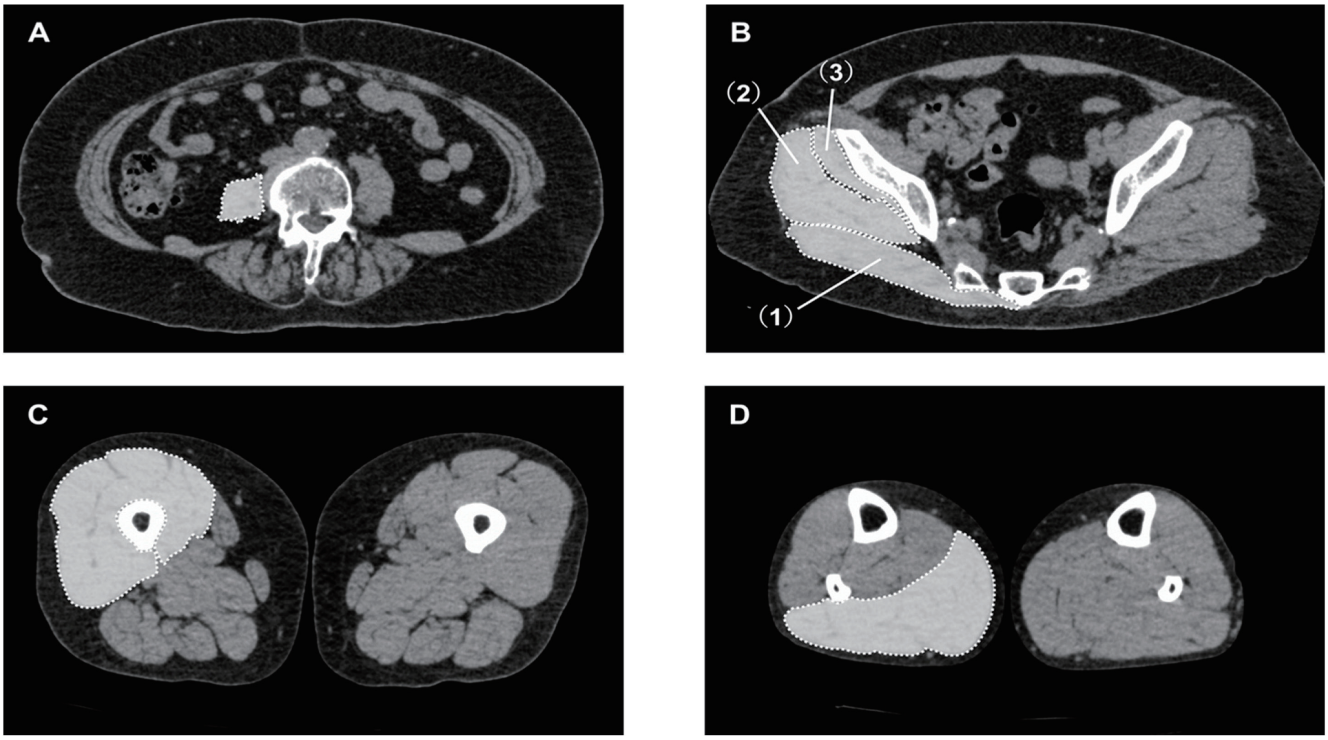

Fig. 1. Transaxial CT images of muscles of interest: (A) psoas major; (B) gluteus maximus (1), gluteus medius (2), and gluteus minimus (3); (C) quadriceps; and (D) triceps surae.

hospital include anterolateral and posterolateral approaches, and the percentage of each approach was examined. Moreover, leg length discrepancy (LLD) and hip pain while walking at 2 weeks after THA were investigated. The LLD was measured using an anteroposterior pelvic radiograph taken in an upright standing position.[19] Hip pain while walking at the time of measurement was rated on a 100-mm visual analog scale ranging from 0 (no pain) to 100 points (worst pain possible).[20]

Bias

Consecutive cases of patients that underwent THA during the inclusion period were included to eliminate the influence of participant selection bias. Conversely, given the study design, it was difficult to achieve complete blinding. In this study, clinicians responsible for measuring fatty infiltration in the muscle were blinded to the details of other examinations.

Statistical Analysis

The normality of dataset distribution was tested using the Shapiro–Wilk test. For between-group comparisons in the non-decreased and decreased walking speed groups, the chi-squared test was employed for categorical variables, whereas the *t*-test or Mann–Whitney U test was used for continuous variables. Cramer's V and Pearson's correlation coefficient (r) for categorical and continuous variables, respectively, were calculated as indices of effect sizes for between-group comparisons. The effect sizes for Cramer's V and Pearson's correlation coefficient (r) were interpreted as follows: small, 0.1; medium, 0.3; and large, 0.5.[21] Multivariate logistic regression analysis was used to analyze the relationship between fatty infiltration of each skeletal muscle and walking speed. Separate analyses were conducted for the operative and nonoperative sides. Age, sex, BMI, and postoperative pain while walking (POPW) were selected as covariates. All variables were analyzed using the forced entry method. To account for the multicollinearity of the independent variables and covariates, variance inflation factors (VIFs) were calculated. Odds ratios (ORs) and the corresponding 95% confidence intervals (CIs) were calculated for each model. All statistical analyses were performed using EZR software (version 1.55; Jichi Medical University Saitama Medical Center, Saitama, Japan),[22] and statistical significance was recognized for $P<0.05$.

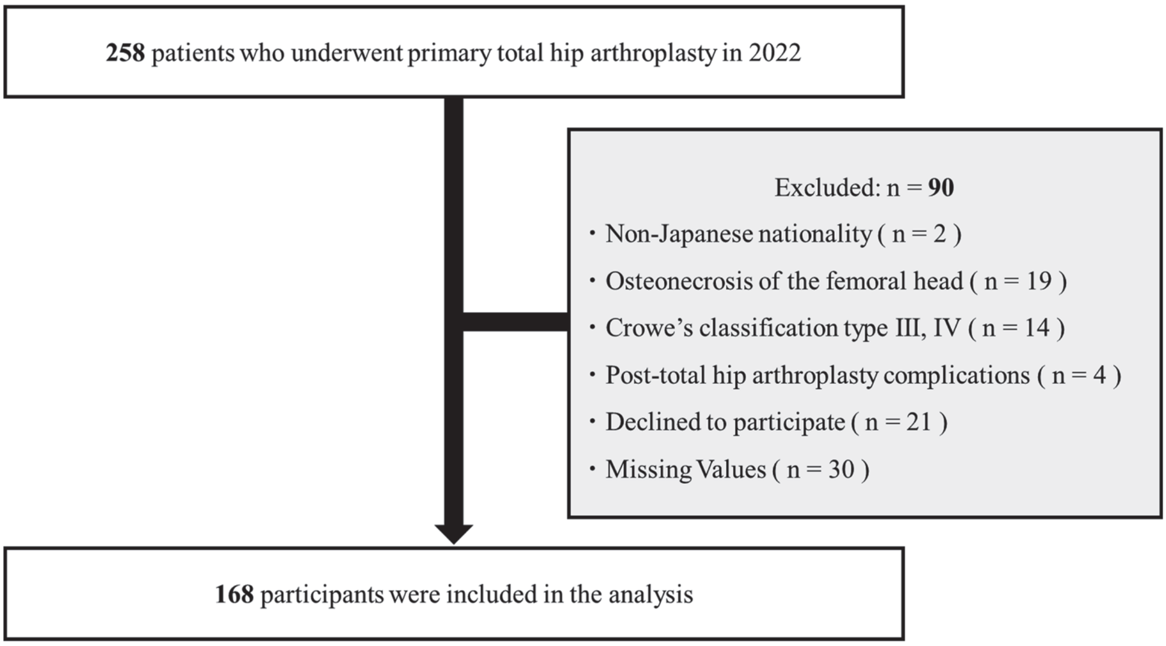

Fig. 2. Flowchart of participant recruitment.

Sample Size

Based on a previous study, at least five events were needed for each included independent variable.[23] The number of independent variables to be included in our logistic regression model was ten. We noted that the percentage of patients undergoing THA with a walking speed less than 0.8 m/s has not been reported. In general, decreased walking speed has been associated with an increased risk of falls. Therefore, the sample size was based on the reported incidence of falls in patients after THA. Previous studies have documented fall rates ranging from 20.4% to 30.0% in this population.[24,25] Based on these previous studies, we assumed that 30% of patients would show decreased walking speed after THA. With this assumption, we estimated that 167 participants would be needed in this study.

RESULTS

A total of 168 participants were included in the analysis (**Fig. 2**). Of the included participants, 48 (28.6%) were classified into the decreased walking speed group. The characteristics of the participants are presented in **Table 1**. The decreased walking speed group had significantly higher POPW and higher age than the non-decreased walking speed group. The relationship between fatty infiltration and walking speed in each muscle is shown in **Table 2**. The decreased walking speed group had significantly lower CT values for the lower extremity muscles other than the gluteus minimus and triceps surae muscles on the operative side. On the nonoperative side, the decreased walking speed group had significantly lower CT values for all lower extremity muscles.

The results of the logistic regression analysis examining the association between fatty infiltration of the lower extremity muscles and walking speed at 2 weeks after THA are summarized in **Tables 3 and 4**. On the operative side (**Table 3**), the analysis identified the CT value of the gluteus medius (OR: 0.95, 95% CI: 0.91–0.99) as a determinant of decreased walking speed after THA. On the nonoperative side (**Table 4**), the analysis identified the CT value of the quadriceps (OR: 0.91, 95% CI: 0.83–0.99) as a determinant of decreased walking speed after THA. No problematic multicollinearity was observed among the independent variables or covariates entered into each model.

DISCUSSION

We examined the relationship between preoperative fatty infiltration of the lower extremity muscles and walking speed at 2 weeks postoperatively in patients that underwent THA. Our binomial logistic regression analysis revealed that the decrease in walking speed after THA was influenced by fatty infiltration of the gluteus medius muscle on the operative side and the quadriceps muscle on the nonoperative side. Based on these findings, evaluating and appropriately man-

Table 1. Characteristics of participants with and without decreased walking speed

Characteristic	All patients (n=168)	Non-decreased group (n=120)	Decreased group (n=48)	P value	Effect size
Age, years	67.7 ± 9.3	66.3 ± 9.1	71.2 ± 9.1	0.002	0.23
Sex					
Male	25 (14.9)	19 (15.8)	6 (12.5)	0.641	0.01
Female	143 (85.1)	101 (84.2)	42 (87.5)		
Height, cm	155.2 ± 7.8	156.2 ± 7.8	152.8 ± 7.3	0.011	0.19
Weight, kg	59.5 ± 11.0	60.5 ± 11.6	57.0 ± 8.9	0.064	0.12
BMI, kg/m^2	24.7 ± 3.9	24.7 ± 4.1	24.5 ± 3.4	0.827	0.00
K-L grade					
Grade II	5 (3.0)	4 (3.3)	1 (2.1)		
Grade III	31 (18.5)	24 (20.0)	8 (14.6)	0.713	0.02
Grade IV	132 (78.6)	92 (76.7)	40 (83.3)		
Musculoskeletal diseases					
Hip OA on NOS	31 (18.5)	20 (16.7)	11 (22.9)	0.381	0.02
THA on NOS	27 (16.1)	20 (16.7)	7 (14.6)	0.821	0.00
Knee OA on OS	7 (4.2)	5 (4.2)	2 (4.2)	0.999	0.00
Knee OA on NOS	8 (4.8)	6 (5.0)	2 (4.2)	0.999	0.00
TKA on OS	4 (2.4)	2 (1.7)	2 (4.2)	0.322	0.03
TKA on NOS	4 (2.4)	2 (1.7)	2 (4.2)	0.322	0.03
Spinal disease	37 (22.0)	27 (22.5)	10 (20.8)	0.998	0.00
CCI	0.3 ± 0.7	0.3 ± 0.7	0.3 ± 0.7	0.865	0.00
Surgical approach					
Posterolateral	40 (23.8)	27 (22.5)	13 (27.1)	0.551	0.01
Anterolateral	128 (76.2)	93 (77.5)	35 (72.9)		
Postoperative LLD, mm	3.7 ± 6.3	3.4 ± 6.2	4.3 ± 6.5	0.399	0.08
POPW, mm on VAS	20.2 ± 19.0	17.2 ± 17.8	27.7 ± 20.0	<0.001	0.26

Data for continuous variables are presented as mean ± standard deviation; data for categorical variables are given as number (percentage). Cramer's V was used as a measure of effect size for categorical variables, Pearson's correlation coefficient (r) was used for continuous variables.

K-L grade, Kellgren-Lawrence grade; NOS, nonoperative side; OS, operative side; TKA, total knee arthroplasty; VAS, visual analog scale.

aging fatty infiltration in these muscles from the preoperative phase onward may help prevent reduced postoperative walking speed in patients scheduled for THA.

The novelty of this study lies in the identification of fatty infiltration of the lower extremity muscles influencing walking speed at 2 weeks after THA. Several studies have reported the association between fatty infiltration of the lower extremity muscles and walking speed in patients who underwent THA.[6,7] However, previous studies have been limited to the monitoring of patients at more than 6 months after THA or the monitoring of a single lower extremity muscle. In contrast, our study evaluated fatty infiltration in multiple lower limb muscles and examined its association with walking speed at 2 weeks after THA. Therefore, our findings complement the existing knowledge on the relationship between walking speed and fatty infiltration of the lower extremity muscles in patients who have undergone THA.

The findings of this study suggest that fatty infiltration of the gluteus medius and quadriceps muscles on the operative and nonoperative sides, respectively, are risk factors for decreased walking speed after THA, even after accounting for age and POPW. In patients who have undergone THA, fatty infiltration of the gluteus medius muscle on the operative side has been associated with postoperative limping gait and Trendelenburg sign.[26] In older adults, fatty infiltration of the quadriceps muscle has been associated with decreased walking speed.[4] When walking after THA, patients may use compensatory strategies for the lower extremity on the

Table 2. Comparison of muscle CT value as indicator of fatty infiltration in muscle between decreased walking speed group and non-decreased walking speed group

Muscle	All patients (n=168)	Non-decreased group (n=120)	Decreased group (n=48)	P value	Effect size
Operative side					
Psoas major	31.8 ± 11.8	33.2 ± 11.5	28.3 ± 12.0	0.015	0.20
Gluteus maximus	32.2 ± 13.4	33.5 ± 12.9	28.8 ± 14.0	0.038	0.13
Gluteus medius	28.6 ± 11.7	30.9 ± 9.8	22.7 ± 14.1	<0.001	0.28
Gluteus minimus	23.2 ± 8.8	23.8 ± 8.8	21.7 ± 8.9	0.158	0.10
Quadriceps	42.5 ± 8.5	44.3 ± 7.6	38.3 ± 9.1	<0.001	0.33
Triceps surae	32.5 ± 8.4	33.2 ± 8.2	30.7 ± 8.7	0.071	0.18
Nonoperative side					
Psoas major	31.3 ± 12.9	32.8 ± 12.0	27.6 ± 14.3	0.017	0.19
Gluteus maximus	34.3 ± 11.8	35.6 ± 11.4	31.1 ± 12.3	0.024	0.13
Gluteus medius	35.9 ± 7.3	37.0 ± 7.7	33.3 ± 5.6	0.003	0.27
Gluteus minimus	27.8 ± 10.5	28.8 ± 8.5	25.4 ± 11.6	0.061	0.12
Quadriceps	46.2 ± 7.5	47.7 ± 5.6	42.5 ± 10.1	<0.001	0.32
Triceps surae	38.5 ± 8.8	39.4 ± 8.5	36.5 ± 9.3	0.061	0.17

Data given in Hounsfield units and presented as mean ± standard deviation.
Pearson's correlation coefficient (r) was used for effect size.

Table 3. Multivariable logistic regression analysis of operative side

Muscle	Model 1		P value	Model 2		P value
	OR	95% CI		OR	95% CI	
Psoas major	0.98	0.95–1.02	0.311	0.98	0.95–1.02	0.301
Gluteus maximus	1.02	0.98–1.05	0.361	1.02	0.99–1.06	0.251
Gluteus medius	0.96	0.92–0.99	0.028	0.95	0.91–0.99	0.014
Gluteus minimus	0.99	0.95–1.04	0.751	0.99	0.95–1.04	0.771
Quadriceps	0.95	0.90–1.00	0.059	0.95	0.90–1.01	0.111
Triceps surae	0.98	0.94–1.02	0.281	0.98	0.93–1.02	0.331

Model 1 was analyzed without adjusting for covariates; Model 2 included potential confounding factors (age, sex, BMI, POPW). VIF: Model 1, 1.06–1.55; Model 2, 1.06–1.70. Chi-squared test: Model 1, P <0.001; Model 2, P <0.001. Hosmer-Lemeshow test: Model 1, P=0.681; Model 2, P=0.111.

Table 4. Multivariable logistic regression analysis of nonoperative side

Muscle	Model 1		P value	Model 2		P value
	OR	95% CI		OR	95% CI	
Psoas major	0.99	0.96–1.02	0.562	0.99	0.96–1.03	0.671
Gluteus maximus	1.01	0.97–1.05	0.731	1.00	0.96–1.05	0.982
Gluteus medius	0.99	0.93–1.06	0.841	1.00	0.93–1.07	0.973
Gluteus minimus	0.97	0.94–1.01	0.152	0.98	0.94–1.01	0.182
Quadriceps	0.91	0.84–0.98	0.017	0.91	0.83–0.99	0.035
Triceps surae	0.98	0.94–1.02	0.241	0.98	0.94–1.02	0.361

Model 1 was analyzed without adjusting for covariates; Model 2 included potential confounding factors (age, sex, BMI, POPW). VIF: Model 1, 1.07–1.77; Model 2, 1.07–2.02. Chi-squared test: Model 1, P <0.001; Model 2, P <0.001. Hosmer-Lemeshow test: Model 1, P=0.351; Model 2, P=0.412.

nonoperative side to compensate for functional deficits of the lower extremity on the operative side. Previous studies have reported that walking ability after THA is influenced by the knee extensor muscle strength on the nonoperative side.[27,28] Therefore, based on previous studies and our results, focusing on fatty infiltration of the gluteus medius and quadriceps muscles on the operative and nonoperative sides, respectively, may be the key to preventing short-term postoperative reduction in walking speed in patients after THA.

Fatty infiltration of the lower extremity muscles, which is the focus of this study, can be readily assessed using CT. Skeletal muscle evaluation using CT is of increasing interest because of its critical role in prognosticating the outcome of various surgical procedures. In patients scheduled for THA, CT is routinely employed for planning implant size, component alignment, and postoperative leg length adjustments.[29] Therefore, it may be possible to identify patients at risk of short-term reduction in walking speed after THA based on the use of available CT images without the need for additional examinations. Effective interventions for fatty infiltration of the muscles have been reported, including neuromuscular electrical stimulation training[30] and nutritional supplementation.[31] However, short-term postoperative interventions alone may not sufficiently reverse preexisting fatty infiltration. Therefore, initiating targeted interventions before surgery—particularly for the quadriceps on the nonoperative side—could be beneficial, considering that pain may limit high-velocity training of the gluteus medius on the operative side. Moreover, combining nutritional supplementation or nutritional therapy with neuromuscular training for the gluteus medius from the preoperative phase onward might further improve fatty infiltration. Nevertheless, these recommendations should be further validated.

This study has several limitations. First, some variables that could have significantly influenced the results were omitted. The postoperative function of patients after THA is affected by psychological and musculoskeletal conditions (e.g., low back pain). However, our study did not investigate these factors. In addition, the use of medications for pain was not evaluated. Inadequate pain management after THA may cause decreased walking speed. Furthermore, only the surgical approach was surveyed for surgical information. It has been suggested, but not accounted for in this study, that all considerations regarding the design and placement of implants can affect patient outcomes.[32] Therefore, it will be necessary to consider these other factors that may affect short-term walking speed after THA. Second, this study did not consider preoperative walking speed. Therefore, it is impossible to conclude whether fatty infiltration alone contributed to the reduction in postoperative walking speed or reflected the original reduction in walking speed. Third, the proportion of female participants was sixfold higher than that of male participants. Among patients with hip OA, more severe and symptomatic cases have been reported in women,[33] potentially explaining the sex distribution of participants in our study. Therefore, the external validity of the findings for men is limited. Finally, this was a single-center study. Functional improvement after THA is affected by differences in hospital volume and recovery protocols.[34] Therefore, our findings may not be generalizable to other institutions. In addition, the outcome measurement of this study was recorded at 2 weeks after THA. This means that the long-term influence of fatty infiltration of muscle on walking speed is unknown. Further multicenter studies with larger sample sizes and longer follow-up periods are warranted.

CONCLUSIONS

In patients undergoing THA, increased fatty infiltration of the gluteus medius and quadriceps on the operative and nonoperative sides, respectively, was associated with decreased walking speed at 2 weeks postoperatively.

ACKNOWLEDGMENTS

We thank all members of the clinical research team who contributed toward data collection in this study, and we thank the members of the Tanaka laboratory (Graduate School of Humanities and Social Sciences, Hiroshima University) for helpful discussions.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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