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Hip Abductor Strengthening Exercises Following Total Knee Replacement- A Need or Luxury

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Abstract

Total knee replacement (TKR) is a well renowned surgical procedure for those presenting with intractable joint pain and impaired physical function following end stage knee osteoarthritis (OA). It is well established that any exercise performed and supervised will improve pain and physical function in people with knee OA. Proximal muscle contribution especially the hip abductors are important in providing frontal plane stability, the stabilization of trunk and hip during walking, maintaining the femoropelvic alignment, femoral head stability and transferring the forces from the lower limbs to the pelvis and considered as important for enhanced functional performance. Recent studies have proven that proximal muscle weakness especially hip abductors play a vital role in knee joint function and a significant reduction in hip abductor strength observed in knee OA. Hip abductor strengthening exercises given post TKR could possibly enhance physical function and pain, might share a contribution similar to quadriceps strength in improving functional performance. Hip abductor strengthening exercises could be a key component in rehabilitation following TKR for enhanced physical function. This review attempts to report the evidence supporting the involvement of the hip abductor strength and its influence on pain and physical functional in post total knee replacement.

Keywords: Total knee replacement; Exercises; Hip abductor

Introduction

Total knee replacement (TKR) is a well renowned surgical procedure for those presenting with intractable joint pain and impaired physical function following end stage knee osteoarthritis (OA) [1,2]. Early rehabilitation aiming pain reduction, improved physical function and patient satisfaction were the main goals following TKR [3,4]. TKR provides a substantial pain relief; enhanced health related quality of life for 90% of patients with a varied physical function [5]. Preoperative factors like increase in age >80 years, higher BMI >40, emotional wellbeing and quadriceps strength were positively associated with higher likelihood of poor functional performance following TKR [6].

Amongst, the poor predictor's quadriceps strength is an imperative factor for improved knee functional performance [7]. Recent studies assessed the strengthening of quadriceps post TKR and found strength increments at 6 months and 1 year following surgery [8-10]. However, Bade et al. [11] in his study documented that patients who underwent unilateral TKR had persistent impairment in functional outcome when compared to healthy adults and recommended the need of a more intensive rehabilitation [11]. Later, the same authors found that a high intensity rehabilitation program shown better Improvement in functional performance measures when compared to low intensity rehabilitation program me with age matched and sex matched controls [4].

Despite the improvements observed, a contemporary systematic review recognized that there are small and mixed changes in physical activity at 6 months and at 1 year; it was considerably lower when compared with healthy adults [12]. Declined functional tasks of 15% reduced walking speed, 50% more time taken to complete stair climbing tasks and 20% less distance covered during the six minute walk test were reported following TKR when compared to their healthy age matched controls [11,13].

Therefore, it is skeptical whether exercises steering quadriceps strengthening alone will improve physical function after TKR. It is implausible that quadriceps strengthening alone could contribute to physical function following OA of the knee; contribution of proximal muscle weakness could possibly lead to altered physical function [14]. Recent studies have proven that proximal muscle weakness especially hip abductors play a vital role in knee joint function and a significant reduction in hip abductor strength observed in knee OA [15,16]. The hip abductors are well renowned for the stabilization of trunk and hip during walking, maintaining the femoropelvic alignment, and transferring the forces from the lower limbs to the pelvis [17,18]. Weakness of the hip abductor can lead to contralateral pelvic drop, this in turn will shifting the center of mass with increased load medially to the medial tibiofemoral joint [19].

Thus, an increased medial joint loading could progress to development of knee OA and increase strength of hip abductors might have a disease modifying effect by reducing the medial joint loading [20]. However, eight weeks of home program of hip abductor exercises not reduced the knee joint loading but shown an improvement in functional performance [21] Arnold et al. in a recent systematic review

concluded that significant hip strength deficits observed in knee OA patients and recommended that hip strength assessments may assist with targeted rehabilitation [22].

Piva et al. [23] revealed that hip abductor strength was an independent correlate of functional performance measures for participants who underwent TKR [23]. In a study by Alnahdi et al., the physical function following unilateral TKR was associated with hip abductor strength and revealed that it contributes to the improvement in performance-based test and not in the self-reported functional measure [24]. Hip abductor strength could possibly share a contribution similar to quadriceps strength in improving functional performance. In view of the above findings, we postulated that hip abductor strengthening exercises are likely to be the catalyst for the improvement in the physical function following TKR.

As a corollary, the hip abductor strengthening exercises established a favorable path for targeted rehabilitation to enhance physical function for those who undergo TKR. We believe studies should use hip abductor strengthening exercises as an adjunct with quadriceps strengthening exercise following TKR for the enhanced performance based functional measure. Future trials should investigate whether hip abductor exercise provide enhanced self-reported and performance based functional outcome measure when added to the quadriceps exercise with proven efficacy or when applied over a longer period to consider it as clinically important or relevant. We recommend future trials to lay focus on the effect of hip abductor strength in pain and self-reported; performance based functional performance in further investigation.

Conclusion

The authors believe that hip abductor strengthening post-total knee replacement is an important predictor of the expected functional outcome. Future studies designing an effective rehabilitation protocol can implement hip abductor strengthening and consider, as essential concept following TKR. Hip abductor strengthening exercises could be a key component in rehabilitation following TKR for enhanced physical function.

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