Impact on Physical Function and Quality of Life with Early Rehabilitation Post Renal Transplantation Living Donor: A Case Study

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ABSTRACT

Persons with End Stage Renal Disease (ESRD) experience poor quality of life due to poor physical function. After the transplant, his physical fitness did not improve, ultimately creating a vicious cycle of inactivity, increasing the risk of cardiovascular and other causes of death. A 39-year-old man was diagnosed with ESRD and underwent a renal transplant from a living donor. He underwent early post-operative rehabilitation from day one and continued until he was discharged. The study was conducted at Dr. Cipto Mangunkusumo National Hospital. Persons with ESRD showed significant improvement during the rehabilitation program. On the sixth day, he took a 4-meter walk test in 17.58 seconds and made a good impression. He was then discharged and continued remote rehabilitation until day 14. Physical inactivity leads to decreased survival, increased morbidity, and increased mortality. Early rehabilitation for post-renal transplantation may become a potential intervention to improve a person with ESRD's physical activity and quality of life, especially in Indonesia.

KEYWORDS: End stage renal disease; Living donor; Rehabilitation; Renal transplantation; Quality of life

INTRODUCTION

According to Basic Health Research 2018, the prevalence of kidney failure in Indonesia was 3.8% [1]. The global prevalence of chronic kidney disease (CKD) is 13.4% (11.7–15.1%), and persons with end-stage renal disease (ESRD) who require renal replacement therapy are estimated between 4,902 and 7,083 million [2, 3].

More than half of people with ESRD worldwide are over sixty-five years of age. Renal transplant recipients are less active than people with rheumatoid and osteoarthritis. In persons with renal transplantation, low physical activity is associated with a higher risk of cardiovascular and all other causes of death. Persons who underwent Renal transplants usually show sarcopenia (low muscle strength, muscle mass, and physical performance) [4, 5]. After the transplant, the physical fitness did not improve completely, triggering a vicious cycle of low inactivity.

This case report demonstrated persons with ESRD underwent renal transplantation. He had been diagnosed with stage 3 CKD six years before his mother's live donor transplant procedure. During post-operative treatment, he was treated with early exercise and showed good progress in physical activity. Therefore, this case study was conducted to raise the awareness of every clinician to consider early rehabilitation in renal transplant patients

CASE PRESENTATION

A 39-year-old man received living donor (mother) renal transplantation on January 18, 2022, after being diagnosed with end-stage renal failure and hemodialysis. He had CKD

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stage 5 with bad laboratory results (serum creatinine 3.2 mg/dl, estimated glomerular filtration rate (GFR)= 24 mL/min/1.73 m^2). Hemodialysis three times a week was needed as the person developed end-stage kidney disease. He was discharged and ordered to take complete blood counts, serum creatinine, serum glucose, and blood urea nitrogen (BUN) weekly for two months. He had several comorbidities: hypertension since 2013 and diabetes mellitus since 2003; he also complained of shortness of breath while walking 20-30 steps, fatigue, and reduced work capacity.

On the 3rd-day post renal transplantation, the subject underwent the first rehabilitation with a general examination of consciousness and vital signs; he was alert and stable, his thoracoabdominal breathing patterns were normal, and he had stable vital signs. The subject did a sit-to-stand test; he stood for five minutes with a blood pressure of 176/90 mmHg, a heart rate of 90 beats per minute regularly, a respiratory rate of 24 times per minute, a saturation of 98%, and a Borg scale 13-3-1. He underwent various exercises on the 1st–5th day, like chest expansion, deep breathing exercises, and bed mobilization until walking exercises.

On the 6th day of rehabilitation, he completed a 4-meter walk test (4MWT) in 17.58 seconds, which is impressive. However, he complained of weariness and halted a 6-minute walk test (6MWT) at 2 minutes 16 seconds (Borg scale: 13-3-2), and his fatigue and shortness of breath improved after a breathing exercise. From Day 7th–14th, the subject was discharged and continued remote rehabilitation at home; the exercise progressed to walking exercises, chest expansion exercises, deep breathing exercises, Active Range of Motion (AROM), and Strengthening exercises to bilateral upper and lower limbs walking exercises 5x100 meters (see Fig. 1).

The authors certify that patient consent has been taken to participate in the study and publish clinical details and images. The patients understand that their names and initials will not be published, and all standard protocols will be followed to conceal their identity.

DISCUSSION

This person was diagnosed with CKD stage 3 in 2016, which progressed to stage 5 before transplantation. He had several comorbidities, hypertension since 2013 and diabetes mellitus since 2003. The persons complained of dyspnea, weakness, and fatigue before transplantation; physical inactivity is strongly associated with poor prognosis and decreased quality of life. Inactivity affects body composition, muscle strength, and performance. Sustainable resistance training with elastic bands increased 30-s sit-to-stand (STS) and decreased 8-foot timed-up and go (TUG) in 171 hemodialysis patients without side effects [6]. Physical activity reduces cardiovascular mortality and improves hypertension control, diabetes control, and health-related quality of life by enhancing psychological conditions and physical function. Post-renal transplantation recipients have no exercise guidelines. Early mobilization in kidney transplant rehabilitation restores gastrointestinal function and lowers hospital stay, surgical problems, and activity in daily living (ADL) [7]. Onofre *et al.* found that early physiotherapy programs did not improve functional walking capacity or peripheral muscle strength in living donor kidney transplant recipients [8]. The subject was discharged and continued remote rehabilitation at home with several exercises.

The subject underwent a renal transplant at the age of 39 years. This is advantageous because younger people can show post-operative improvement more quickly. However, the effect of improved transplant outcomes with age is unclear due to a bias with medical comorbidities in older adults.

On the 3rd-day post renal transplantation, the subject underwent the first rehabilitation; after several mobilizations and exercise, his blood pressure was 176/90, heart rate was 84 beats per minute, respiration rate was 20 times per minute, saturation was 98%, and body temperature was normal Borg scale 9-1-1 without subjective complaints. He underwent various exercises on the 1st–5th day, like chest expan-

Figure 1: The subject underwent deep breathing exercises and lower limb walking exercises on the 6th days.

sion, deep breathing exercises, and bed mobilization until walking exercises. His vital signs were steady.

On day six, the reported person completed a 4MWT in 17.58 seconds. (Borg scale 7-0-0). The subjective complaint of weariness halted a 6MW at 2 minutes 16 seconds. (Borg scale: 13-3-2). Physical performance, measured by the 6MWT, is a reliable survival predictor in people with ESRD [9]. Self-paced walking capacity assessments measure submaximal exertion functional abilities in daily living. 6MWT has a VO2 peak; therefore, it may be a good alternative for folks who can't tolerate ergometric tests [10]. Due to its affordability and simplicity, 6MWT is frequently used in clinical settings. Due to subjective weariness, this participant could not complete the 6MWT, so the test was done with 4MWT and provided good results. A shorter 4MWT is better than 6MWT. Kittelson et al. found that 4MWT is reliable and convergent with 6MWT [11]. Thus, 4MWT may substitute clinical assessment. Telerehabilitation at home continued on Days 7-14 with walking, chest expansion, deep breathing, AROM, and strengthening exercises advanced to bilateral upper and lower limb walking 5x100 meters with no subjective complaints and hemodynamic stability.

In conclusion, Persons with living donor renal transplantation often experience physical inactivity. Decreased physical inactivity contributes to low survival, high morbidity, and mortality. Thus, rehabilitation plays an important role in maintaining the physical capability of persons with ESRD and preventing inactivity. Early rehabilitation post-renal transplantation may become a potential intervention to enhance the persons with ESRD physical activity and quality of life.

CONFLICTS OF INTEREST: None declared.

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