

Original Article

Early mobilization intervention for patient rehabilitation after renal transplantation

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Abstract: Objective: To explore the effectiveness of early mobilization intervention on the rehabilitation of patients after renal transplantation. Methods: Seventy renal transplant patients treated in our hospital were designated as the control group (n=35, conventional perioperative management) and the intervention group (n=35, early mobilization intervention based on the concept of fast track surgery (FTS)). Clinical indicators (duration of indwelling drainage tube/urethral catheter, time to first ambulation and hospital stay), gastrointestinal function indicators (time to return of bowel sound, flatus and defecation postoperatively), complications (postoperative incision infection, bleeding, abdominal distension and lung infection) and activities of daily living (ADL) were compared between the two groups. Results: Shorter duration of indwelling drainage tube/catheter, and earlier ambulation and shorter hospital stay were observed in the intervention group than in the control group. The times to return of bowel sound, flatus and defecation were all advanced, and patient satisfaction was increased in the intervention group as well (all $P < 0.05$). Two months after discharge, the scores of ADL in both groups were lower than those before intervention, and those in the intervention group were lower than those in the control group (all $P < 0.05$). Conclusion: FTS-based early mobilization intervention greatly promotes postoperative recovery of patients and improves their ADL.

Keywords: Kidney transplantation, early mobilization intervention, rehabilitation

Introduction

Renal transplantation is the only effective treatment for end-stage renal diseases, and it is a means to extend the lifespan of patients by replacing their failing kidneys; however, some patients do not recover well after transplantation due to various complications and rejection reactions [1]. Postoperative care is essential for postoperative recovery, but traditional care models mostly focus on the disease itself and postoperative complications, rather than physical recovery [2].

The concept of fast track surgery (FTS) is a modified nursing measure intended to reduce surgery-induced stress and to promote postoperative recovery of patients [3]. It is widely used in general surgery, cardiovascular surgery and other departments. Bu et al, proposes that FTS care leads to reduced postoperative complications of patients with gastric cancer [4-6].

Renal transplantation usually takes a long time and causes a serious stress response in patients; besides, it is influenced by traditional medical models, where patients are less active after surgery and have prolonged bed rest, resulting in declined gastrointestinal function and increased risk of deep vein thrombosis of the lower limbs [7, 8]. FTS is based on the principle that early mobilization intervention is beneficial to patients' postoperative recovery [9]. However, the effectiveness of early mobilization intervention after kidney transplantation has rarely been investigated; therefore, the present study discusses the effect of early mobilization intervention on the rehabilitation of patients after kidney transplantation.

Materials and methods

General data

The data of 70 patients who received allogeneic kidney transplantation in our hospital from

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June, 2019 to December, 2020 were prospectively analysed. They were randomly designated as being in the control group (n=35, conventional perioperative management) and the intervention group (n=35, early mobilization intervention based on the concept of FTS). Inclusion criteria: (1) Aged 25-70 years; (2) Patients with end-stage renal disease who received allogeneic kidney transplantation in our hospital; (3) Patients who voluntarily cooperated with this study and signed the informed consent form; (4) Patients with no consciousness and communication disorders. Exclusion criteria: (1) Patients who had received other organ transplants once or at the same time; (2) Patients with mental illness; (3) Patients with cognitive dysfunction or dementia; (4) Patients with communication disorders. Ethics approval was granted by the Ethics Committee of our hospital.

Methods

Both groups of patients received allogeneic kidney transplantation. The control group received routine perioperative management, with 8-h preoperative fasting and 6-h water deprivation [10]. Antibiotics were used to prevent infection 30min before surgery and after surgery. Patients were instructed to turn their heads to one side to keep their respiratory tract unobstructed. The drainage tube and catheter were routinely retained after surgery, and were removed 5-6 days afterward.

The intervention group had FTS-based early mobilization intervention [11, 12]. (1) Patients were deprived of food and water for at least 8 hours before surgery. After anesthesia, they were allowed to take a small amount of warm water, followed by a liquid or semi-liquid diet lasting until 48 h after surgery, and then transitioned to a normal diet on postoperative day 3. (2) An analgesic pump was used for continuous analgesia, which was removed on postoperative day 3, and opioid analgesics were taken as needed instead. (3) Appropriate psychological counseling was given. (4) Antibiotics were routinely given for 3-5 days to prevent infection, and patients were instructed to cough and assisted in sputum evacuation to maintain an unobstructed airway. (5) Postoperatively, fluid infusion therapy was given following the principle of "quantitate inlet for outlet", and the changes in patients' vital signs were closely monitored. (6) Early mobilization intervention

after surgery: On postoperative day 1, patients were allowed to turn over in bed within their tolerance range. On postoperative day 2, they practiced sitting up in bed and did postoperative rehabilitation exercises in bed with the assistance of nursing staff. On postoperative day 3, patients were allowed to do activities at the bedside.

Outcome measures

Main outcome measures: (1) Clinical indicators of the duration of the indwelling drainage tube and urethral catheter, time to first ambulation and hospital stay were recorded. (2) Postoperative restoration of gastrointestinal function was evaluated in terms of time to the return of bowel sound, flatus and defecation. (3) The activities of daily living (ADL) scale was used to evaluate the ADL before and after the intervention in both groups [13]. Physical Self-Maintenance Scale (PSMS; 24 points) and Instrumental Activities of Daily Living (IADL; 32 points), were used with a total of 56 points. The ADL increased with decreasing scores.

Secondary outcome measures: (1) Complications after transplantation, such as postoperative incision infection, bleeding, abdominal distension and lung infection, were recorded. Total incidence of complications = number of complications/total number of cases $\times 100\%$. (2) A hospital self-made satisfaction questionnaire was employed to estimate the satisfaction of patients: satisfied (>90 points), moderately satisfied (60-89 points) and unsatisfied (<60 points). Satisfaction rate (satisfied + moderately satisfied) cases/total cases $\times 100\%$.

Statistical analysis

SPSS 20.0 was used for data processing, and categorical data were expressed as n (%) and analysed by χ^2 test. Continuous data were expressed as ($\bar{x} \pm sd$). Paired t test was used for intra-group comparison, and independent samples t test was used for inter-group comparison. The difference was statistically significant at $P < 0.05$.

Results

General data

Renal transplantation was successfully performed in both groups, and no patient dropped

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Table 1. General data of patients in the two groups (n, $\bar{x} \pm sd$)

Indicators	Intervention group (n=35)	Control group (n=35)	χ^2/t	P
Gender (n)			0.516	0.473
Male	20	17		
Female	15	18		
Age (years)	48.8±6.4	49.3±5.9	0.340	0.735
BMI (kg/m ²)	22.30±2.18	22.03±1.97	0.544	0.588
Primary disease (n)			1.844	0.870
Chronic glomerulonephritis	6	8		
Diabetic nephropathy	4	6		
Hypertensive nephropathy	10	11		
Polycystic kidney disease	5	3		
IgA nephropathy	5	4		
Other	5	3		
Operation time (min)	176.5±33.3	180.0±26.4	0.487	0.628
Intraoperative blood loss (mL)	159.95±23.33	164.33±30.07	0.681	0.498

Note: BMI: Body Mass Index.

Table 2. Clinically-related indicators of the two groups ($\bar{x} \pm sd$)

Group	Indwelling time of drainage tube (d)	Catheter indwelling time (d)	First time to get out of bed after surgery (h)	Hospital stay (d)
Intervention group (n=35)	5.22±1.04 [#]	5.43±1.11 [#]	26.50±3.22 [#]	9.97±1.28 [#]
Control group (n=35)	7.23±1.25	6.98±1.64	67.57±8.80	13.33±2.47

Note: Compared with control group, [#]P<0.05.

out during the study. The two groups were comparable for general data (all P>0.05, **Table 1**).

Clinical indicators

Shorter duration of indwelling drainage tube/catheter, and earlier ambulation and shorter hospital stay were observed in the intervention group than the control group (all P<0.05, **Table 2**).

Postoperative recovery of gastrointestinal function

The times to return of bowel sounds, flatus and defecation were all advanced in intervention group compared with the control group (all P<0.05, **Table 3**).

ADL scores

Before intervention, the differences in PSMS, IADL scores and total ADL scores between the two groups were not statistically significant (all P>0.05). Two months after discharge, the

scores decreased in both groups, and those in the intervention group were lower than those in the control group (all P<0.05, **Table 4**).

Postoperative complications

There was no significant difference in total incidence of postoperative complications between the two groups (P>0.05, **Table 5**).

Patient satisfaction

Patient satisfaction in the intervention group reached 94.29% (33/35), which was remarkably higher than that in the control group (77.14%, 27/35, P<0.05, **Figure 1**).

Discussion

Patients with end-stage renal diseases are in poor physical condition, with high risk in renal transplantation and are prone to a variety of postoperative complications, greatly hindering their postoperative recovery and endangering their lives in severe cases [14, 15]. Therefore,

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Table 3. Relevant indexes of postoperative gastrointestinal function recovery in the two groups ($\bar{x} \pm sd$, h)

Group	Recovery time of postoperative bowel sounds	Time of first anal exhaust after operation	Time of first anal defecation after operation
Intervention group (n=35)	8.48±2.20 [#]	14.49±3.22 [#]	25.50±4.44 [#]
Control group (n=35)	14.44±3.79	25.10±3.74	42.28±6.60

Note: Compared with control group, [#]P<0.05.

Table 4. Comparison of ADL scores before and after intervention in the two groups ($\bar{x} \pm sd$, score)

Group	PSMS scores	IADL scores	ADL scores
Intervention group (n=35)			
Before the intervention	15.40±3.22	20.07±3.86	35.47±4.33
Two months after discharge	8.86±2.29 ^{*#}	14.03±2.94 ^{*#}	22.89±4.73 ^{*#}
Control group (n=35)			
Before the intervention	15.78±3.27	19.76±3.22	35.54±4.86
Two months after discharge	11.03±2.96 [*]	16.60±3.20 [*]	27.63±4.05 [*]

Note: PSMS: Physical Self-Maintenance Scale; IADL: Instrumental Activities of Daily Living; ADL: activities of daily living. Compared with Before the intervention, ^{*}P<0.05; compared with Control group, [#]P<0.05.

the question of how to promote the early recovery of patients after kidney transplantation has become one of the main concerns in the field of kidney transplantation.

The concept of FTS refers to various nursing measures implemented during the perioperative period to reduce patients' physiological and psychological stress, lower the risk of complications and promote patients' prognosis [16, 17]. In the present study, shortened duration of indwelling drainage tube/catheter, time to ambulation and hospital stay, as well as a quicker time to the return of bowel sounds, flatus and defecation in intervention group suggest that FTS-based early mobilization intervention effectively restores the gastrointestinal function and shortens the length of hospital stay of patients receiving kidney transplantation. There are two main reasons for this outcome: (1) The concept of FTS encourages early feeding and emphasizes that patients should take a small amount of warm water, followed by a liquid or semi-liquid diet lasting until 48 h after surgery, and then are transitioned to a normal diet on postoperative day 3. These not only help to reduce the stimulation of the intestinal tract, but also promote gastrointestinal peristalsis and the recovery of intestinal function [18]. (2) The core of FTS includes postoperative fluid management and anesthesia and

analgesia. According to the principle of "quantitate inlet for outlet", the patients who received kidney transplantation were given fluid infusion therapy, and their vital signs were closely monitored. Analgesic pump was used for continuous analgesia postoperatively, and opioid analgesics were taken as needed to relieve the pain. All these are helpful to promote postopera-

tive recovery of patients [19]. Consistent with our results, Nöth et al, indicates that the implementation FTS contributes to the restoration of gastrointestinal function after orthopedic surgery [20]. Moreover, Pranboon et al, also proposes that early postoperative ambulation is associated with increased gastrointestinal peristalsis [21].

Reducing postoperative complications and promoting recovery have been considered to be central to FTS [22]. In the present study, the total incidence of postoperative complications in the intervention group was slightly lower than that in the control group, and PSMS, IADL scores and ADL scores were lower 2 months after discharge, suggesting that FTS-based early mobilization intervention reduces the risk of postoperative complications and improves ADL. However, there is no statistical difference in the total incidence of postoperative complications between the two groups, which may be related to the small sample size and biased selection. In addition, we noticed that patients in the intervention group were more satisfied than those in the control group, indicating that FTS-based early mobilization intervention increases patient satisfaction.

However, the study was limited by its small sample size and short follow-up period (2

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Table 5. Comparison of postoperative complications between the two groups (n, %)

Group	Postoperative incision infection	Postoperative bleeding	Abdominal distension	Lung infection	Total incidence
Intervention group (n=35)	1 (2.86)	2 (5.71)	5 (14.29)	2 (5.71)	10 (28.57)
Control group (n=35)	1 (2.86)	2 (5.71)	6 (17.14)	3 (8.57)	12 (34.29)

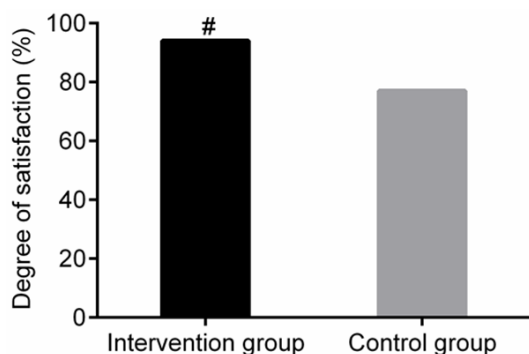


Figure 1. Comparison of nursing satisfaction between the two groups. Compared with control group, #P<0.05.

months). The effect of FTS-based early mobilization intervention on postoperative recovery and long-term ADL of kidney transplant patients still needs to be further elucidated.

To sum up, the implementation of FTS-based early mobilization intervention greatly promotes postoperative recovery of gastrointestinal function after kidney transplantation, and improves their postoperative ADL.

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Disclosure of conflict of interest

None.

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