Effects of Different Walking Assistance Methods on Patients Undergoing to Total Knee Surface Replacement in Western Guixi Area Applied Research

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Abstract: _Objective:_ _To explore the application of two different walking assistance methods, frame type and axillary type, in the postoperative functional exercise of patients with artificial total knee surface replacement, and compare the effects of the two different walking assistance methods on patients' pain, psychological state, knee joint function, The impact on the patient's overall function and the occurrence of falls._ _Methods:_ _100 patients who underwent total knee surface replacement were selected as the research subjects. They were randomly divided into a frame-type group and an axillary-type group according to the type of walkers used. Patients in the frame-type group used frame-type walkers to assist in exercises, and in the axillary-type group. The patient uses an axillary walker to assist with exercises. The VAS pain score, PHQ-9 questionnaire score, simple knee joint function score, overall function score and the occurrence of patient falls were compared between the two groups of patients after using different walking aids for 3 months of exercise._ _Results:_ _After three months of intervention, the VAS scores of patients in the frame style group were lower than those in the axillary style group, and the difference was statistically significant (P=0.002＜0.05); the PHQ-9 scores of patients in the frame style group were lower than those in the axillary style group, and the difference was statistically significant. Significance (P=0.024<0.05); the simple knee joint score and overall function score of patients in the frame type group were higher than those in the axillary type group, and the difference was statistically significant (P<0.05)._ _Conclusion:_ _The use of frame-type walkers to assist in exercises after artificial total knee surface replacement is beneficial to reducing the patient's pain, improving the patient's mood, and promoting the recovery of the patient's knee joint function._

Keywords: Knee replacement, Walking assistance method, Knee joint function.

1. Introduction

Osteoarthritis is a degenerative disease caused by the degeneration of articular cartilage and subsequent bone hyperplasia caused by a variety of factors. Knee Osteoarthritis (KOA) mainly manifests as knee joint pain in the early stage. As the disease progresses, stiffness, deformity, and even functional limitation gradually occur. As age and weight increase, the occurrence and development of KOA become more and more serious, especially among elderly women, resulting in a decrease in the quality of life of many elderly patients [1]. Clinically, surgical treatment or non-surgical treatment is adopted according to the severity of KOA. Total knee arthroplasty (TKA), currently used to relieve end-stage KOA joint pain, has developed into a mature surgical treatment. Although TKA surgery has good results and can ultimately completely resolve pain and rebuild knee joint function [2], early postoperative functional exercise is very important for the recovery of knee joint function in KOA patients, which directly affects the overall functional condition of the patient after surgery, and thus affects Patient quality of life [3]. Because KOA patients have poor lower limb strength after surgery, they need walkers to assist them in exercising. At present, the walking aids commonly used in clinical practice in China are mainly frame-type and armpit-type crutches. However, there are still few relevant scientific studies to date whether there are differences between the two in preventing falls, and whether there is a correlation between the two in terms of functional exercise effects for patients after TKA. Therefore, this article explores the impact of different types of walkers used by patients on postoperative knee joint functional exercises, thereby providing a basis for patients to choose appropriate walkers, improving the effect of functional exercises, helping patients restore knee joint function, and shortening recovery time.. The report is as follows.

2. Research Objects and Methods

2.1 Research Object

100 patients who underwent TKA at the Orthopedic Surgery Department of a tertiary hospital in Baise City, Guangxi Zhuang Autonomous Region from January 2021 to December 2022 were selected as the research subjects of this study. They were divided into a frame group and an axillary group according to the random method. group of 50 patients.

2.2 Inclusion and Exclusion Criteria

Inclusion criteria: 1) Meet the diagnostic criteria for knee osteoarthritis in the "Chinese Osteoarthritis Diagnosis and Treatment Guidelines" [4], be clearly diagnosed as unilateral knee osteoarthritis, and have indications for total knee replacement surgery; 2) First-time total knee replacement surgery For knee replacement surgery, patients and their families gave informed consent to the surgical plan. 3) Subjects can receive WeChat video follow-up.

Exclusion criteria: 1) Those with severe abnormality of liver and kidney function, consciousness disorder or mental abnormality; 2) Those who are participating in other studies

that affect the results of this study. 3) Rheumatoid arthritis, traumatic arthritis, and ligament damage around the knee joint.

2.3 Research Methods

2.3.1 Grouping

According to the SPSS random number generator grouping, they were randomly divided into frame group and armpit group. Put the notes with numbers and groups in an opaque envelope and arrange them in order from smallest to largest. Patients who meet the inclusion criteria after screening will be divided into the frame group and the armpit group according to the envelope bag number and group.

2.3.2 Intervention methods

Frame type group: patients use frame type walkers to assist in exercise after TKA;

Axillary group: Patients in the axillary group used axillary walkers to assist in exercises after TKA.

Specific intervention methods:

(1) Before the patient undergoes surgery, the patient is demonstrated and taught to use walking aids.

(2) 6 hours after surgery, guide and encourage patients to perform functional exercises, as follows: 1) Guide patients to perform ankle pumps, quadriceps exercises, leg press exercises, knee bend exercises, ice packs, etc., and guide them to perform straight leg raising exercises. 3 times/day, 30 minutes each time. 2) On the first day after surgery, patients are encouraged to walk and exercise 3 times/day, 30 minutes/time. 3) After the patient is discharged from the hospital, the patient will be followed up by phone and reminded to perform functional exercises to understand the patient's implementation of functional exercises and whether there are any wrong behaviors, and make timely corrections. 4) Three months after the operation, the patient's pain status, psychological state, simple knee joint function score, overall function score, and postoperative falls were followed up via WeChat video.

2.3.3 Observation indicators

(1) Patient general information survey: including patient's name, gender, age, education level, height, weight, place of residence, etc.

(2) Patient's visual pain score (VAS): The visual analogue scale (VAS score) commonly used in orthopedics is used. No pain: 0 points; mild pain: 1-3 points; moderate pain: 4-6 points; severe pain: 7-10 points [5]. The VAS scores of the two groups of patients before surgery and 3 months after surgery were compared, and the knee joint pain of the patients was determined by the scores.

(3) Patient's Mental Health Questionnaire-9 (PHQ-9): This scale is an assessment scale for the presence and degree of depression in patients. It is widely used in scientific research because it is easy to understand by patients and easy to operate by medical staff. and clinical practice. The total score of PHQ-9 is 27 points. According to clinical application experience, 0 to 4 points indicate no depression, 5 to 9 points indicate mild depression, and 10 to 27 points indicate moderate or severe depression [6]. Compare the emotional health status of the two groups of patients before surgery and 3 months after surgery.

(4) Knee Society Score (KSS): The KSS score adopts a variable weighting method and consists of two parts: "articularity score" and "functional score". It is a professional knee joint physical assessment of patients by doctors. A score on the patient's knee function obtained through examination and face-to-face questioning. A full score of 100 points means that the patient has no pain in the knee joint, has intact performance, and can perform activities above 125° without any instability in the front, back and inside. The KSS scores of the two groups of patients before surgery and 3 months after surgery were compared, and the recovery of knee joint function of the patients was determined by the level of the scores.

(5) The occurrence of patient falls.

2.4 Statistical Methods

Data were analyzed using SPSS25.0 statistical software. The measurement data that obeys the normal distribution are represented by ($\bar{x} \pm s$), and the t test is performed for comparison between groups; the measurement data that are not normally distributed are represented by (M(P25, P75)), and the rank sum test is performed. Count data are expressed as [n(%)], and χ^2 test is used for comparison between groups; P<0.05 indicates that the difference is statistically significant.

3. Results

3.1 Comparison of the General Information of KOA Patients between the Two Groups

there were 9 males and 41 females in the frame group, with an average age of (64.26±7.41) years. There were 10 males and 40 females in the armpit group, with an average age of (64.06±6.77) years. Comparing the general data of the two groups, the difference was not statistically significant (P>0.05). The differences in the baseline data of the two groups of patients were comparable. See Table 1 for details.

Table 1: General information of KOA patients in the two groups (n%)/$\bar{x} \pm s$

Items		Frame-type(n=50)	Axillary-type group(n=50)	t/χ^2	P
Age		64.26±7.41	64.06±6.77	0.141*	0.339
Fender				0.650**	0.799
	Male	9	10		
	Female	41	40		
Education				0.153**	1.000
	Elementary school and below	39	39		

	Middle school	9	9		
	College degree or above	2	2		
Habitation	Cities and towns	6	5	0.102**	0.749
	Rural area	44	45		
Weight		60.68±9.51	60.02±9.34	0.350*	0.727
Height		155.56±7.65	154.42±9.38	0.666	0.507

Note: * is t; ** is χ^2 test.

Table 2: VAS scores and PHQ-9 status of two groups of KOA Table 3 months after surgery (M(P25, P75))

Group	Cases (n)	VAS scores		PHQ-9 scores	
		Preoperative	3 months after surgery	Preoperative	3 months after surgery
Frame-type	50	6(6,7)	2(1,3)	5.5(3,9)	2.5(1,3)
Axillary-type group	50	6(6,7)	3(2,4)	6(4,9)	3(2,5)
Z		-0.162	-3.093	-0962	-2.262
P		0.871	0.002	0.336	0.024

Table 3: Months after surgery (M (P25, P75))

Group	Cases (n)	Simple knee joint scores		Overall functional scores	
		Preoperative	3 months after surgery	Preoperative	3 months after surgery
Frame-type	50	54(43.5,62.25)	81(77,84)	55(52,59)	80(75,85)
Axillary-type group	50	51(43,57)	77(71.75,80.25)	54(52,57)	75(65,80)
Z		1.301	-3.823	-1.291	-3.448
P		0.193	<0.001	0.197	0.001

3.2 Comparison of Pain Scores and Depression Scores between the Two Groups of KOA Patients

Using the Mann-Whitney U test, the VAS scores and depression scores of patients in the frame group 3 months after TKA were lower than those in the axillary group, and the difference was statistically significant (P <0.05). See Table 2 for details.

3.3 Comparison of Knee Joint Scores between the Two Groups of KOA Patients

3 months after surgery, the KSS score of KOA patients in the frame-type group was significantly higher than that of the axillary-type group, and the difference was statistically significant (P<0.05). See Table 3 for details.

Table 3 Simple knee joint scores and overall functional scores of two groups of KOA.

3.3 Comparison of the Occurrence of Falls Among KOA Patients in the Two Groups Three Months after Surgery:
There was no statistically significant difference in the occurrence of falls between the two groups of KOA patients (P<0.05), see Table 4.

Table 4: Falls situation of two groups of KOA patients three months after surgery

Item		Frame-type(n=50)	Axillary-type group(n=50)	χ^2	P
Falling				0.796	00.372
	Yes	5	8		
	No	45	42		

4. Discussion

Artificial knee replacement is a major joint reconstruction surgery. It is an important treatment method for treating knee joint diseases, relieving pain in the affected limb, improving knee joint function, and improving the patient's quality of life. Artificial TKA is the most effective treatment for end-stage knee osteoarthritis. It can restore the patient's knee joint function and has significant curative effect. TKA has now developed into a mature surgical treatment for KOA to relieve joint pain in end-stage osteoarthritis and improve the function of the affected limb. With the advancement of surgical technology and the widespread application of accelerated recovery, the average length of stay for patients undergoing TKA continues to shorten. If patients do not receive effective rehabilitation guidance and miss the best opportunity for recovery, they are prone to various complications. Rehabilitation exercises are still required after knee resurfacing replacement (TKA) surgery to achieve maximum functional results. However, there are certain risks when patients actively participate in rehabilitation exercises after surgery. Especially in the early postoperative period, the patients have not completely eliminated the effects of anesthesia and surgical trauma, are in poor physical condition, and the muscles and soft tissues around the patient's joints have not been completely repaired. The patient cannot fully bear the weight of the body, and at the same time, the patient will also be affected by pain, causing the limbs to shrink protectively. These factors together lead to patients being prone to falls during early postoperative rehabilitation exercises. Walking aids are widely used in orthopedic patients after surgery. Knee joints need walking aids to prevent patients from falling during home recovery after knee replacement and to reduce the weight on the affected knee. Early postoperative functional rehabilitation exercises must highlight fall prevention and lower limb load dispersion measures [7].

4.1 The Impact of the Use of Two Walking Aids on Patients' Postoperative Pain and Psychological Aspects

The results of this study show that the VAS scores of patients in the frame-type walker group 3 months after surgery were significantly lower than those in the axillary-type group, and the difference was statistically significant (P<0.05), indicating that the use of frame-type walkers to assist patients in postoperative functional exercises can Effectively relieve patient pain. It may be related to the fact that frame-type walkers have a larger contact area with the ground and better stability than arm-type walkers [8]. During the exercise process, the patient's upper limbs share more body weight, effectively relieving the body's pressure on the knees, thereby reducing knee joint pain. The results of this study show that the PHQ-9 scores of patients using frame-type walkers 3

months after surgery were significantly lower than those in the axillary group, and the difference was statistically significant (P<0.05), indicating that the use of frame-type walkers is beneficial to patients' relief. Psychological stress. Pain has a direct impact on the effectiveness and compliance of post-operative exercise in TKA patients, and those with mild pain are more likely to adhere to functional exercises [9]. In this study, the pain of patients using frame-type walkers to assist with exercise was significantly lower than that of patients in the axillary group. Therefore, the psychological burden of exercise on patients in the frame-type walkers group was significantly reduced.

4.2 The Impact of the Use of Two Walkers on Patients' Postoperative Knee Joint Function

The results of this study show that the simple knee joint function score and overall function score of patients in the frame-type group 3 months after surgery were significantly higher than those in the axillary-type group, and the difference was statistically significant (P<0.05), indicating that the use of frame-type walkers is more advantageous. Use as an auxiliary exercise in the axillary group. Studies have shown that the use of walking aids to assist patients with lower limb fractures after surgery can effectively improve knee joint function and help promote the recovery of walking ability [10]. The role of walking aids in patients' postoperative functional exercises is to improve the patient's body balance and stability, ensure patient safety during exercise, and avoid falls. Compared with armpit walkers, frame-type walkers have a stronger stabilizing effect and help patients maintain body balance during exercise. In this study, patients using frame-type walkers can significantly reduce joint pain and are also beneficial to the exercise and recovery of knee joint function.

4.3 The Impact of the Use of Frame Walkers and Armpit Crutches on Patients' Falls

The results of this study show that there is no significant difference in the incidence of falls among patients within three months after surgery between the two types of walker-assisted exercises, which is consistent with the research results of Lei Yali and other scholars [11]. Although in theory, the method of implementing a frame walker is better than the armpit walker in terms of stability, in actual application, the support effect obtained by using armpit crutches can also achieve better fall prevention. effect.

In summary, patients who have undergone artificial total knee surface replacement use a frame-type walker to assist in exercises, which is beneficial to reducing the patient's pain, improving the patient's mood, and promoting the recovery of the patient's knee joint function, and is worthy of clinical promotion and application. However, this study had a small sample size and was only conducted in a single center. The follow-up period was short, only three months, and no longer-term recovery could be observed. In future studies, the sample and research scope will be further expanded and the follow-up time will be extended to conduct more in-depth research.

Conflict of Interest

The authors have no conflicts of interest to declare.

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