

Efficacy of high flexion total knee prosthesis replacement in the treatment of osteoarthritis of the middle-aged and elderly knee

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Abstract: To study the clinical efficacy of high-flexion total knee prosthesis replacement in the treatment of middle-aged and elderly knee osteoarthritis. Methods: Sixty middle-aged and elderly patients with osteoarthritis of the knee admitted to the hospital between January 2020 and December 2022 were selected and randomly grouped to compare the various treatment effects of the two groups of patients. Results: The various treatment effects of patients in the observation group were better than those in the control group ($P < 0.05$). Conclusion: Treatment of middle-aged and elderly patients with knee osteoarthritis by high-flexion total knee prosthesis can improve the clinical effect and is worth promoting.

Keywords: High-flexion total knee prosthesis replacement; Stable prosthesis replacement; Clinical outcomes; Middle-aged and elderly knee osteoarthritis.

1. Introduction

Osteoarthritis of the knee is a degenerative disease, the main incidence of the elderly population, the early onset of the disease is slow, the clinical symptoms are not typical, with the progression of the disease, the patient's knee joint function gradually lost, deformity, or even disability. Some patients are treated with medications, which are not effective, and need to be treated with artificial knee prostheses, which are replaced with fixed platform prostheses, which take longer to operate, but after surgery, patients have poor knee motion [2-3]. With the gradual progress of clinical medicine, high flexion total knee prosthesis replacement is widely used in the treatment of middle-aged and elderly patients with osteoarthritis of the knee, which has a tibial platform as well as the ability to rotate freely under the liner, with a higher

degree of anastomosis, lower restriction, and less contact stress, with obvious advantages. In this paper, the authors selected 60 middle-aged and elderly patients with knee osteoarthritis admitted to the hospital between January 2020 and December 2022, aiming to analyze the effect of the application of high-flexion total knee arthroplasty, which is described below.

2. Materials and Methods

2.1. General information

Sixty middle-aged and elderly patients with osteoarthritis of the knee admitted to the hospital between January 2020 and December 2022 were selected and randomly grouped, and the general information of the patients is shown in Table 1. note: This study was ethically approved by the hospital.

Table 1. Comparison of general information ($\bar{x} \pm s$) [n (%)]

Group	Number of cases	Age group (years)	Average age (years)	Male Patients	Female patients
Observation group	30	52-75	62.45±5.78	14	16
Control group	30	52-72	62.19±5.61	13	17
X ² / t	-		0.177		0.067
P	-		0.860		0.795

Inclusion criteria: 1) confirmation of patients with osteoarthritis of the knee; 2) disease classification between grade III-IV; 3) informed about this study and agreed to participate.

Exclusion criteria: (i) bone loss of the knee joint; (ii) traumatic injury to the joint; (iii) severe infection; (iv) patients with contraindications to surgery.

2.2. Methods

Observation group: High flexion total knee arthroplasty: A longitudinal incision was made at the midpoint of the patient's knee, and the joint capsule was incised avoiding the patella, the joint was carefully cleaned, the lateral patellar ligament was severed, and the knee joint was exposed, and the joint margins and the joint bones were removed. The tibial articular

surface is osteotomized extramedullary, the flexion gap is measured, an intercondylar osteotomy is made, and a prosthetic model is fabricated to correct the marginal growths. If the patient's patella is less than 22 mm thick, the cartilage on the patella surface is effectively removed, and if the patient's patella is more than 22 mm thick, the patella is replaced. The trajectory of the patella is confirmed, the bone debris and blood clots are carefully rinsed, and then the bone trabeculae are cleaned to ensure that the interface is kept clean as well as dry. After the trial mold of the prosthesis is installed, it needs to be debugged, the high flexion rotating prosthesis is reasonably selected, and the bone cement is modulated according to this, and the fixation process is carried out through polymethylmethacrylate. After the prosthesis is placed, polyethylene is used for padding, and the patellar

mobility of the knee joint is After placement of the prosthesis, polyethylene was used for padding, and the mobility of the knee joint was carefully checked to detect whether soft tissue extrusion and popping reaction of the knee joint occurred in a timely manner.

Control group: prosthetic artificial knee arthroplasty: a suitable fixed platform prosthesis was installed, and the rest of the measures were the same as in the observation group.

After the surgery, both groups of patients needed to be treated with routine analgesia and anti-infection, and the drainage tube needed to be removed on the second day after the surgery, and then the patients' postoperative recovery status and their own tolerance were observed, and functional training was done for the patients.

2.3. Observation indicators

1)VAS score and HHS score (recovery of knee function) before and after treatment.

2)Total treatment efficiency.

3) Incidence of adverse reactions.

4)joint pressure pain score, joint swelling score, and duration of morning stiffness.

5) Knee function scores before and after treatment.

2.4. Statistical treatment

SPSS 20.0 statistical software was used, where mean + standard deviation ($\bar{x} \pm s$) was used to represent the

measurement data, which was verified by calculating t-values, and rate (%) was used to represent the count data, which was verified by calculating χ^2 .

3. Results

3.1. Comparison of VAS and HSS scores before and after treatment

See Table 2.

3.2. Comparison of total clinical treatment efficiency

See Table 3.

3.3. Comparison of the incidence of adverse reactions

See Table 4.

3.4. Comparison of joint pressure pain scores, joint swelling scores, and time to morning stiffness

See Table 5.

3.5. Comparison of knee function scores

See Table 6.

Table 2. Comparison of VAS and HSS scores before and after treatment ($\bar{x} \pm s$) (points)

Group	Number of cases	Pain score		Knee function recovery score	
		Before treatment	After treatment	Before treatment	After treatment
Observation group	30	7.17±1.44	1.35±0.16	48.35±4.62	82.19±6.24
Control group	30	7.19±1.49	3.46±0.71	48.79±4.71	76.26±5.76
t	-	0.053	15.879	0.365	3.825
P	-	0.958	0.000	0.716	0.000

Table 3. Comparison of total clinical treatment efficiency [n (%)]

Group	Number of cases	Show effect	Effective	Invalid	Total efficiency
Observation group	30	19	9	2	28 (93.3)
Control group	30	19	10	1	29 (96.7)
χ^2	-	-	-	-	0.351
P	-	-	-	-	0.554

Table 4. Comparison of the incidence of adverse reactions [n (%)]

Group	Number of cases	Anterior Knee Pain	Constipation	Disgusting	Incidence
Observation group	30	0	0	1	1 (3.3)
Control group	30	0	1	1	2 (6.7)
χ^2	-	-	-	-	0.351
P	-	-	-	-	0.554

Table 5. Comparison of joint pressure pain scores, joint swelling scores, and time to morning stiffness ($\bar{x} \pm s$)

Group	Number of cases	Joint pressure pain score (points)		Joint swelling score (points)		Morning stiffness time (min)	
		Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Observation group	30	3.16±0.6	1.29±0.2	2.60±0.4	1.20±0.2	130.52±26.4	22.02±3.7
Control group	30	3.14±0.6	1.49±0.3	2.63±0.4	1.59±0.2	130.48±26.3	25.09±3.9
t	-	0.125	2.794	0.255	6.543	0.006	3.086
P	-	0.901	0.007	0.800	0.000	0.995	0.003

Table 6. Comparison of knee function scores ($\bar{x} \pm s$) (points)

Group	Number of cases	limping		Swelling		Unstable	
		Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Observation group	30	9.13±0.48	2.03±0.41	9.09±0.44	1.87±0.31	8.81±0.33	2.01±0.23
Control group	30	9.26±0.47	5.08±0.44	9.10±0.43	4.81±0.36	8.80±0.32	5.17±0.26
t	-	1.060	27.777	0.089	33.896	0.119	49.860
P	-	0.294	0.000	0.929	0.000	0.906	0.000

4. Discussion

As the age of the patient increases, the level of inorganic salts in the body's bone becomes higher, bone elasticity, bone quality, and bone toughness decrease significantly, and the incidence of knee osteoarthropathy increases. According to the data available at : when the patient is over 60 years old, the long-term disability rate of knee osteoarthropathy is the second highest among orthopedic diseases, and the first is cardiovascular disease. The main clinical manifestations of osteoarthrosis of the knee include pain and pressure in the patellofemoral joint area and friction sounds. Prompt and effective treatment of osteoarthrosis of the knee is needed to reduce the disability rate of patients.

The use of fixed platform prosthesis artificial knee arthroplasty can improve the function of the patient's knee to a certain extent, but the anastomosis between the prosthesis and the normal tissue is low and can produce reactions such as polyethylene liner wear and osteolysis. The study shows that the optional platform is able to apply coupling to disperse contact stresses, which is consistent with the principle of knee motion and prevents friction between the tibial articular surface and the liner, effectively preventing excessive wear of the prosthesis and the liner and significantly increasing the duration of use of the prosthesis. The high-flexion rotating platform prosthesis is a gradual improvement on the conventional prosthesis, which in turn reduces patellofemoral pressure, thus avoiding patellofemoral impingement and reducing the rate of patellofemoral wear and dislocation. The design of this procedure is based on a knee mobility platform that simulates human knee mobility, while at the same time enhancing the thickness of the posterior femoral condyle, lengthening the patellar groove, aligning the biomechanical characteristics of the prosthesis with those of the knee by modifying the meniscus, and deepening the patella and intercondylar snare to reduce the incidence of anterior knee pain and other complications. The incidence of complications such as anterior knee pain is greatly reduced [10-11].

The results of this paper showed that all treatment effects of patients in the observation group were better than those in the control group. The results of this paper are generally consistent with the findings of the study by Blue Innovations. It is evident that high flexion total knee prosthesis for knee osteoarthropathy resulted in a significant increase in knee mobility and knee function due to the fact that high flexion total knee prosthesis can promote knee function reconstruction and increase the rate of recovery of knee function, further increasing knee mobility significantly. In addition, the high flexion total knee prosthesis provides continuous maintenance of the stability of the knee prosthesis, which allows for a balance of forces at the prosthetic interface,

resulting in timely functional training and significant improvement in knee function in patients with osteoarthrosis of the knee. In addition, during surgery, the posterior femoral condyle needs to be effectively cleaned, and if necessary, the femoral capsule needs to be released. Before the patella is treated, the cartilage on the surface of the patella needs to be corrected to fully expose the subchondral bone to prevent the joint from popping, and at the same time, to ensure that the soft tissue tension of the patient is maintained in a balanced state to further improve the stability of the joint and prevent the prosthesis from Dislocation reaction.

In conclusion, the treatment of middle-aged and elderly patients with knee osteoarthrosis by high flexion total knee prosthesis replacement is clinically effective, has high application value, and is worth promoting.

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