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Original Article

Observation of clinical efficacy of total knee arthroplasty surgery in the treatment of elderly rheumatic arthritis

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Abstract: Objective: To explore the clinical efficacy of total knee arthroplasty (TKA) surgery in the treatment of rheumatic arthritis of elderly. Methods: A total of 98 elderly patients with rheumatic arthritis who underwent TKA surgery in our hospital from June 2015 to July 2017 were retrospectively studied. The conditions of the patients were recorded before and after surgery, and a follow-up visit was conducted at 3-24 months (average of 13.0±2.4 months) after surgery. Hospital for special surgery (HSS) scores, range of motion (ROM) of the knee joint and visual analog scale (VAS) pain scores were used to evaluate the knee joint function before and after surgery, and observe whether there were complications. A 36-item short-form (SF-36) health survey was adopted to assess the patients' quality of life. Results: After final follow-up visit, HSS scores of knee joint of the 98 patients were increased from 44.312±6.225 points before surgery to 89.164±7.194 points after surgery (P=0.000). The excellent and good rate was 88.776%. The ROM of knee joint was improved obviously at the final follow-up visit compared with that before surgery. It was increased from 43.609±2.816° before surgery to 103.097±4.318° after surgery (P=0.000). The VAS scores of the patients after final follow-up visit were 2.164±0.452 points, which were significantly lower than those before surgery (7.130±1.223 points, P=0.000). The patients' three characterization values of phlebothrombosis were reduced at the follow-up visit after surgery, among which the fibrinogen was decreased to the normal range. The total incidence rate of complications was 30.612%. The patients' quality of life after surgery was remarkably higher than that before surgery. The difference was statistically significant (P=0.000). Conclusion: Artificial TKA surgery can effectively improve ROM of the knee joint, reduce the pain and improve the quality of life for the patients. It has a good clinical efficacy for the treatment of elderly rheumatic arthritis.

Keywords: Total knee arthroplasty, elderly rheumatic arthritis, clinical efficacy

Introduction

Rheumatic arthritis is a connective tissue disease that occurs frequently. It is one of the erosive diseases, and mainly characterized with easy recurrence and long course of disease [1]. It is the most common chronic disease in the elderly, which can involve many joints and muscle tissues of the whole body, such as the knee joint and the ankle joint, and seriously affects the quality of life of the patients [2].

In recent years, total knee arthroplasty (TKA) surgery has achieved good efficacy in the treatment of osteoarthritis, rheumatic arthritis and other degenerative diseases of the knee joint [3]. With the increasingly aging of the population, TKA surgery is applied more and more widely [4]. TKA surgery is a major treatment for advanced rheumatic arthritis and can be classified into non-restrictive, partially restrictive and restrictive prostheses based on the degree of joint deformity in patients [5, 6]. With the increasingly aging of the population and the development of medical technology, the application of TKA surgery in the treatment of rheumatic arthritis has shown an upward trend [7, 8]. Most of the patients can basically resume normal living activities and significantly improve the quality of life after undergoing TKA surgery [9].

However, there are still complications in the treatment with TKA surgery. Studies have shown that 14%-44% of patients have complications after undergoing TKA surgery, which are

mainly manifested in thrombus and leg veins [10]. Moreover, studies also indicated that many elderly patients adopt conservative treatment for rheumatic arthritis due to the worry about the surgical risks, pain, complications and other problems [11-13]. Therefore, there is great space and challenge for the clinical treatment and application of TKA surgery in elderly rheumatic arthritis. The outcomes of artificial TKA surgery in regard of recovery degree of joint function, the elimination of pain, the relief of phlebothrombosis and other complications, as well as the quality of life of the elderly were analyzed comprehensively in this study, thus providing clinical reference for its application. Now it is reported as follows.

Materials and methods

General data

A total of 98 patients (40 males and 58 females) with rheumatic arthritis that received TKA surgery in our hospital from June 2015 to July 2017 were selected as the objects of the study. They were aged from 60 to 80 years old with an average of 72.216±12.523 years old. The average of hospital for special surgery (HSS) knee scores was 44.312±6.225 points.

Inclusion criteria: Patients with age of over 60 years old; patients that were diagnosed with rheumatic arthritis according to the diagnostic criteria specified by the Rheumatism Association of Chinese Medical Association; patients without mental illness that could cooperate during the collection of clinical data; patients who received TKA surgery for the first time.

Exclusion criteria: Patients with the history of TKA surgery; patients with severe heart, liver and kidney diseases; patients with dementia, mental illness and speech disorder.

This study obtained the informed consent of the patients and their families, and was approved by the Medical Ethics Committee.

Methods

All the objects of the study were patients that received TKA surgery after admission to the hospital. Specific operation methods of the surgery were as follows. General anesthesia was conducted for all the patients who lay in the supine position. Tourniquet was used for hemostasis at the thigh root. The surgery was conducted using median incision at the knee joint and medial patellar approach. Equivalent bone amputation was conducted, osteophytes were removed, and the size of the prosthesis was measured. The prosthesis components were fixed with bone cement. Drainage tube was placed to connect with self-blood transfusion equipment. The incision was disinfected and bandaged after being sutured. The drainage tube was removed 48 h after surgery. Antibiotics were used for conventional prevention during the surgery. The follow-up was conducted for the patients for 3-24 months (average of 13.0±2.4 months).

Observation indexes

Firstly, HSS score was used to evaluate knee pain of the patients before and after surgery: 100 points were taken as the full score; ≥85 points were regarded as being excellent, which represented that the knee function of the patients was recovered basically, and that no complication was observed after surgery; points of 70-84 were regarded as being good, which represented that most of the knee function of the patients was recovered, and that there was no complication after surgery; 60-69 points were regarded as being moderate, which represented that part of the knee function of the patients was recovered, and that no severe complication was observed after surgery; ≤59 points were regarded as being poor, which indicated that the recovery of knee function of the patients was not satisfactory. The excellent and good rate = (number of excellent cases + number of good cases)/total cases * 100%. Secondly, range of motion (ROM) of the knee joint was used to evaluate the clinical efficacy of TKA surgery. Thirdly, visual analog scale (VAS) scoring was adopted to detect the pain degree before and after treatment. The score ranges from 0 point to 10 points: 0 point was regarded as painless, while 10 points were regarded was intense pain. Fourthly, D-dimer, fibrinogen (FIB) and erythrocyte sedimentation rate (ESR) were measured to evaluate postoperative complications such as phlebothrombosis of the patients. The normal range of D-dimer was 0-550 ng/mL, FIB was 2-4 g/mL, and ESR was 0-30 mm/h. Fifthly, a 36-item short-form (SF-36) health survey was used to evaluate the patients'

Table 1. Comparisons of HSS scores, ROM and VAS scores at the final follow-up visit before and after TKA surgery

	Case (n)	HSS (score)	ROM (°)	VAS (score)
Before surgery	98	44.312±6.225	43.609±2.816	7.130±1.223
After surgery	98	89.164±7.194	103.097±4.318	2.164±0.452
t		-23.781	-19.664	18.142
P		0.000	0.000	0.000

Note: HSS, hospital for special surgery; ROM, range of motion; VAS, visual analog scale; TKA, total knee arthroplasty.

Table 2. Comparisons of excellent and good rate of HSS scores before and after surgery

	Case (n)	Excellent (n)	Good (n)	Excellent and good rate (%)	χ^2/P
Before surgery	98	18	23	41.837	χ^2=16.863
After surgery	98	39	48	88.776	P=0.000

Note: HSS, hospital for special surgery.

Table 3. Comparisons of relevant characterization values of phlebothrombosis of the patients

	Case (n)	D-dimer (ng/ml) (0-550)	FIB (g/ml) (2-4)	ESR (mm/h) (0-30)
Before surgery	98	998.321±239.425	4.164±1.326	67.134±15.241
After surgery	98	635.146±207.535	3.641±1.252	52.162±10.453
P		0.001	0.000	0.002

Note: FIB, fibrinogen; ESR, erythrocyte sedimentation rate.

quality of life before and after surgery, including physical health, psychological health, mental health and social function. The higher the score was, the higher the quality of life would be.

Statistical methods

SPSS19.0 was used for statistical analysis. Measurement data were presented as mean ± standard deviation ($\bar{x}$ ± sd). t test was used for the comparison between pre- and post-treatment. Enumeration data were expressed as ratio using chi-square test. P<0.05 suggested that the difference was statistically significant.

Results

Comparisons of HSS scores, ROM and VAS scores at the final follow-up visit before and after TKA surgery

Compared with those before surgery, HSS scores of the elderly patients with rheumatic arthritis were improved after the TKA surgery (t=-23.781, P=0.000). ROM after surgery was obviously superior to that before surgery (t=-19.664, P=0.000). VAS pain scores after surgery were significantly lower than those before surgery. The differences had statistical significance (t=18.142, P=0.000). See **Table 1**.

Excellent and good rate of HSS scores at the final follow-up visit after TKA surgery

Patients with excellent HSS scores (≥85 points) after surgery were increased from 18 cases to 39 cases, and there were 48 patients with good HSS scores (70-84 points) at the follow-up visit after surgery. The excellent and good rate of HSS scores after surgery was increased to 88.776%, which was obviously higher than that before surgery. The difference was statistically significant (P<0.05). See **Table 2**.

Complications of the patients after surgery

The characterization values of phlebothrombosis of the patients after surgery were compared with those before surgery, which showed that all the values at the final follow-up visit after surgery were reduced compared with those before surgery, especially D-dimer. FIB was reduced to normal range after surgery, while the mean values of D-dimer and ESR were outside the normal range. The difference had statistical significance (P<0.05). See **Table 3**.

Moreover, among the 98 patients, 7 patients were observed with prosthesis loosening during the follow-up visit after surgery, 12 patients were observed with infection, and 11 patients were observed with phlebothrombosis. The overall incidence rate of complications was 30.612%.

Table 4. SF-36 scores at the follow-up visit after surgery and those before surgery

	Number of cases	Physical health (scores)	Psychological health (scores)	Social function (scores)	Emotional health (scores)
Before surgery	98	23.325±3.314	42.723±3.111	25.202±3.131	38.691±4.132
After surgery	98	51.624±5.911	64.309±4.810	46.346±6.317	52.345±7.322
t		-20.012	-24.443	-18.527	-16.954
P		0.000	0.000	0.000	0.000

Note: SF-36, 36-item short-form.

Comparisons of the patients' quality of life after surgery with that before surgery

A comparative analysis on the scores of quality of life after surgery was conducted for the patients. The scores of each index of SF-36 were increased, and the differences had statistical significance (P=0.000). The conditions of SF-36 at the follow-up visit after surgery and those before surgery were shown in **Table 4**.

Discussion

Rheumatic arthritis is a systemic, consumptive and recurrent allergic and immune disease that mainly damages the joint. The incidence rate increases with age [14, 15]. It occurs in the middle aged and the elderly frequently, among which the female patients take up a great proportion [16]. The main clinical manifestations of the disease include mobile ache at the muscle and the joint, swelling and fever at local site, damage of cartilage, bone and articular capsule surround the joint to some extent, joint deformity and loss of function, which develop into disability finally. They affect the quality of life seriously [17, 18]. Reports have shown that 1/5 of the population aged above 45 years old suffer from arthritis, while elderly rheumatic arthritis accounts for about 40% of all the patients [19]. Therefore, in order to control the development of the disease, avoid further destroy of the joint function and improve the quality of life for the elderly, it is of great clinical significance to study the timely treatment for elderly patients with advanced rheumatic arthritis.

Elderly patients with rheumatic arthritis (>60 years old) who underwent TKA surgery were selected as the objects of the study. HSS scores at the final follow-up visit after surgery were increased by 44.852 points. The difference had statistical significance (P=0.000). The excellent and good rate of HSS scores after surgery was 88.776%, which was increased greatly compared with that before surgery. ROM of the knee joint at the final follow-up visit after surgery was 103.097±4.318°, which was improved obviously compared with that before surgery. The results indicated that TKA surgery can significantly improve the patients' joint movement function. VAS score (2.164±0.452) at the follow-up after surgery was significantly lower than that before surgery (7.130±1.223). The difference was statistically significant (P=0.000). The result suggested that TKA surgery can effectively alleviate joint pain. The reason might be that the injured patella in the knee was cleared, and the damaged knee was replaced by the prosthesis installed in TKA surgery, which reduced the friction with normal tissues, and relieved the pain for the patients. In addition, the characterization values of phlebothrombosis were reduced obviously during the follow-up visit after surgery, especially D-dimer value, and FIB value returned to the normal level. The overall incidence rate of complications such as infection, prosthesis loosening and phlebothrombosis after surgery was 30.612%, which was lower than that (44%) in relevant studies, showing that the complications of patients with rheumatic arthritis were controlled obviously after TKA surgery, but the incidence rate was still at a relatively high level [10]. Rheumatic arthritis not only leads to joint pain and dysfunction and endangers the patients' physical health, but also affects the patients' quality of life. The analysis of SF-36 scores in this study showed that the scores of each item of quality of life at the follow-up visit after surgery were increased compared with those before surgery, and the differences of each item were statistically significant (P=0.000). It indicated that the patients' quality of life can be improved, and that the patients' life satisfaction can be increased after TKA surgery.

In overall, TKA surgery can relive joint pain, increase ROM of the joint, reduce the incidence rate of complications and effectively improve the patients' quality of life. It has good clinical efficacy and is of great value to popularizee TKA in the treatment of elderly patients with rheumatic arthritis. Nonetheless, there are still many problems that need to be addressed, for example, there are still some controversies about the factors affecting the surgery [20, 21], and the incidence rate of complications still needs to be reduced. The sample size used in this study was relatively small, while it is more persuasive to discuss the clinical efficacy of TKA with a relatively large sample size. An in-depth discussion will be conducted on the conclusion of this study in the next step.

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Disclosure of conflict of interest

None.

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