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# Comparative Study on Therapeutic Effect and Life Quality of Elderly Patients with Knee Osteoarthritis and Rheumatoid Arthritis After Total Knee Arthroplasty

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**Abstract**

**Objective**. The purpose was to explore the therapeutic effect of total knee arthroplasty (TKA) in elderly patients with knee osteoarthritis (OA) and rheumatoid arthritis (RA), and to compare the changes in life quality of patients.

**Methods.** The clinical data of patients treated with TKA in our hospital from September 2016 to September 2017 were retrospectively analyzed, including 58 patients with OA and 58 patients with RA, to compare the therapeutic effect and the impact on life quality in the two groups of patients.

**Results.** The KSS clinical score and KSS functional score of the OA group were significantly higher than those of the RA group 12 months after operation (P<0.001). The MRMI scores after treatment in both groups were significantly higher than those before treatment, and the MRMI score of the OA group after treatment was significantly higher than that of the RA group (P<0.001). There was no significant difference in the operation time between the two groups of patients (P>0.05), and the drainage and hospitalization time of the OA group after operation were significant better that those of the RA group (P<0.05). There was no significant difference in the VAS scores between the two groups of patients before operation (P>0.05), and the VAS scores of the OA group at 1 month, 3 months and 12 months after operation were significantly lower than those of the RA group (P<0.001). The MBI and MMSE scores of the two groups after treatment were significantly better than those before treatment (P<0.001), and the MBI and MMSE scores of the OA group after treatment were significantly better than those of the RA group (P<0.001). The SAS and SDS scores after treatment in both groups were significantly lower than those before treatment (P<0.001), and the SAS and SDS scores of the OA group after treatment were significantly lower than those of the RA group (P<0.001). The total incidence of postoperative complications in the OA group was significantly lower than that in the RA group (P<0.05).

**Conclusion.** The therapeutic effect of TKA in OA patients is better than that in RA patients, and the life quality and knee joint recovery after operation in OA patients are significantly better than those in RA patients, with a lower complication rate.

**Keywords:** Elderly patients with knee osteoarthritis (OA); rheumatoid arthritis (RA); total knee arthroplasty (TKA); therapeutic effect; life quality

## Introduction

Osteoarthritis (OA) and Rheumatoid arthritis (RA) are common chronic bone and joint diseases. OA is mainly manifested as knee swelling and pain. Because the disease develops slowly and is difficult to detect, the knee joints of patients will become stiff and deformed over time, resulting in limited daily movement and even complete inability to move in severe cases. RA is a systemic disease mainly characterized by joint lesions, with the pathological basis as synovial inflammation. It can extend to connective tissues such as tendons as the disease progresses, and eventually erode articular cartilage and bone tissues, leading to joint damage and thereby affecting the normal function of patients' joints (Matthew et al., 2018; Vikki et al., 2018). Before the onset of RA, patients may develop symptoms of low fever lasting several

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weeks, and some patients show high fever, general malaise, weight loss, etc. Epidemiological survey (Gray et al., 2018) shows that RA occurs in all regions of the world, with a prevalence rate of about 0.3-1.2 and a total population of nearly 6 million, which has become a major public health problem threatening human health. At present, the etiology of RA is still being explored. Relevant medical studies have shown that RA may be related to the patients' autoimmunity, infection, heredity and other factors (Bogdan et al., 2018; Porter et al., 2018; Yash and Gulati, 2018). Due to the low awareness of RA and OA among most patients in China and the lack of corresponding diagnosis and treatment means in grass-roots areas, delay in clinical diagnosis and inappropriate treatment are very common. In recent years, with the continuous progress of medical technology, TKA has been applied. It is a new treatment technology gradually developed on the basis of the successful application of modern artificial hip joint, which can effectively eradicate the late knee pain and improve the life quality of patients (Yash and Gulati, 2018; Yasser, 2018; Neogi et al., 2018). Based on this, this study was aimed to compare the therapeutic effect of TKA in the treatment of RA and OA, and to provide more clinical basis for the treatment of knee joint diseases, reported as follows.

## 1. Materials and methods

### 1.1 General information

The clinical data of patients treated with TKA in our hospital from September 2016 to September 2017 were retrospectively analyzed, including 58 patients with OA and 58 patients with RA. The OA group had 32 males and 26 females, with an average age of (64.38±3.63) years old, an average course of (5.31±0.58) years, and an average body mass index (BMI) of (25.16±2.38) kg/m$^2$. The RA group had 34 males and 24 females, with an average age of (64.41±3.62) years old, an average course of (5.28±0.62) years, and an average BMI of (25.12±2.35) kg/m$^2$. There was no significant difference in clinical data between the two groups of patients (P>0.05), which was comparable.

### 1.2 Inclusion criteria

①The patients were treated with TKA for the first time and were consistent with surgical indications. ②The patients met the clinical diagnostic criteria of OA or RA. ③ The patients were aged equal to or more than 60 years old. ④This study was approved by the hospital ethics committee, and the patients and their families knew the purpose and process of this experimental study and signed the informed consent.

### 1.3 Exclusion criteria

①The patients were complicated with with systemic coagulation disorder. ② The patients were complicated with other bone and joint diseases. ③the patients had mental and other cognitive disorders. ④The patients recently received immunosuppression or hormone therapy.

### 1.4 Methods

The patients took the supine position, and combined spinal and epidural anesthesia was performed. After anesthesia, a conventional pneumatic tourniquet was used to free the skin layer by layer, and the patella aponeurosis was cut along the medial patella to fully expose the knee joint and remove the excess fat under the patella. The meniscus, anterior and posterior cruciate ligaments, and synovium of OA and RA patients needed to be removed. Then standard osteotomy of the tibial plateau and distal femur was performed. After that, a trial model was installed to test the joint force line, including its tightness, stability and mobility. After the test was completed, the inserted prosthesis was fixed with the bone cement, and then adjusted again. If no error was found, drainage was performed and the incision was sutured. Anticoagulation therapy of low molecular weight heparin calcium (4000U) was used in both groups of patients within 24 hours after operation, once a day for 2 weeks. Conventional antibiotic treatment was performed 3 days after operation to reduce postoperative infection. Drainage tube was removed within 2 days after operation, and straight leg raising training was tried. The patients walked with the assistance of nurses or walking aid 3 days after operation. Both groups of patients received outpatient follow-up or telephone follow-up for 12 months after operation.

### 1.5 Observation indexes

American Knee Society score (KSS) was used to evaluate the knee joint recovery of patients in both groups 2 months after operation. The scale included clinical score and functional score, with a total score of 100 points. The higher the score was, the better knee joint recovery was.

Modified Rivermead Mobility Index (MRMI) (Brown and Banerjee, 2018) was used to evaluate the limb mobility of patients before and after treatment, with a total score of 20 points. The higher the score was, the better the limb mobility of patients was.

The operation indicators of the two groups were

compared, including operation time, intraoperative drainage volume and hospitalization time.

Visual analogue scale (VAS)(Regina et al., 2018) was used to evaluate the pain degree of patients in both groups before operation, 1 month after operation, 3 months after operation and 12 months after operation, with a total score of 10 points. The higher the score was, the stronger the pain of patients was. The time points of before operation, 1 month after operation, 3 months after operation and 12 months were set as D0, D1, D2 and D3 respectively.

The modified Barthel index (MBI) Score (Jonathan et al., 2018) and mini-mental state examination (MMSE) were used to evaluate the life quality of patients in both groups before and after treatment. The total score of the MBI scale was 80 points, and the total score of MMSE scale was 35 points. The higher the scores were, the better life quality of the patients was.

The incidence of complications within 12 months after operation was compared between the two groups of patients.

### 1.6 Statistical Methods

The experimental data were statistically analyzed and processed by SPSS21.0 software. The count data were tested by $X^2$, expressed by [n (%)], and the measurement data were measured by t test, expressed by ( $\bar{x}\pm s$). The difference was statistically significant when $p < 0.05$.

## 2. Results

### 2.1 Comparison of KSS clinical score and KSS functional score 12 months after operation between two groups of patients

The KSS clinical score and KSS functional score of the OA group were significantly higher than those of the RA group 12 months after operation (P<0.05), as shown in Figure 1.

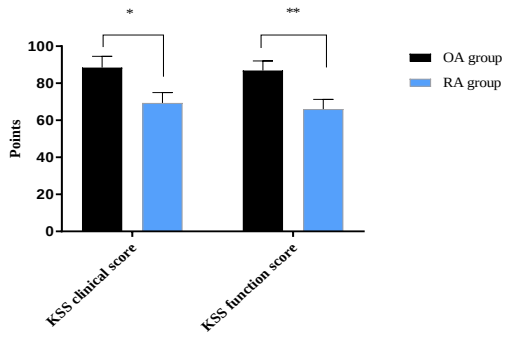


**Figure 1 Comparison of KSS clinical score and KSS functional score 12 months after operation between two groups of patients ( $\bar{x}\pm s$)**

Note: The abscissa represents KSS clinical score and KSS functional score respectively, and the ordinate represents score (points).

The KSS clinical score and KSS functional score 12 months after operation were (84.13±8.64) points and (83.17±7.35) points in the OA group respectively, and were (65.45±7.86) points and (62.34±7.44) points in the RA group respectively.

* indicates that there was a significant difference in KSS clinical score between the two groups of patients (t=12.180, P=0.000);

** indicates that there was a significant difference in KSS functional score between the two groups of patients (t=15.168, P=0.000).

### 2.2 Comparison of MRMI scores before and after treatment between two groups of patients

The MRMI scores after treatment in both groups were significantly higher than those before treatment, and the MRMI score of the OA group after treatment was significantly higher than that of the RA group (P<0.05), as shown in Figure 2

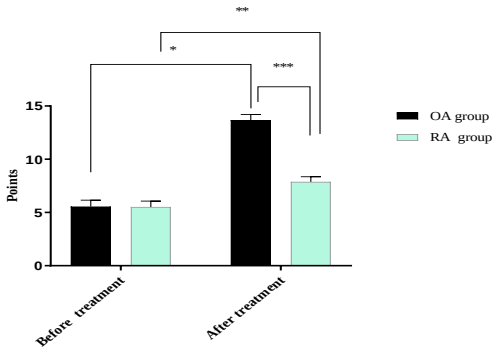


**Figure 2 Comparison of MRMI scores before and after treatment between two groups of patients ( $\bar{x}\pm s$)**

Note: The abscissa represents before treatment and after treatment respectively, and the ordinate represents MRMI score (points).

The MRMI scores before and after treatment were (5.14±0.84) points and (13.31±0.74) points in the OA group respectively, and were (5.12±0.79) points and (7.54±0.68) points in the RA group respectively.

* indicates that there was a significant difference in the MRMI scores in the OA group of patients before and after treatment (t=55.581, P=0.000);

** indicates that there was a significant difference in the MRMI scores in the RA group of patients before and after treatment (t=17.681, P=0.000);

*** indicates a significant difference in the MRMI scores between the two groups of patients after treatment (t=43.725, P=0.000).

### 2.3 Comparison of various operation indicators between two groups of patients

There was no significant difference in the operation time between the two groups of patients (P>0.05), and the drainage and hospitalization time of the OA group after operation were significant better that those of the RA group (P<0.05), as shown in Table 1.

*Table 1.* **Comparison of various operation indicators between two groups of patients ( $\bar{x}\pm s$)**

| Group | n | Operation time (min | Postoperative drainage volume (ML) | Hospitalization time (d) |
|---|---|---|---|---|
| OA group | 58 | 64.65±14.52 | 154.24±35.35 | 8.39±2.45 |
| RA group | 58 | 64.84±14.48 | 221.47±32.53 | 9.35±2.31 |
| t | | 0.071 | 10.658 | 2.171 |
| P | | 0.944 | 0.000 | 0.032 |

### 2.4 Comparison of VAS scores at different time points after operation between two groups of patients

There was no significant difference in the VAS scores between the two groups of patients before operation (P>0.05), and the VAS scores of the OA group at 1 month, 3 months and 12 months after operation were significantly lower than those of the RA group (P<0.05), as shown in Figure 3.

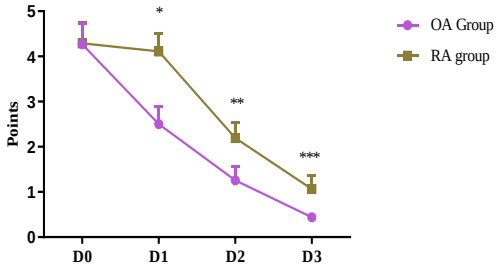


**Figure 3 Comparison of VAS scores at different time points after operation between two groups of patients ( $\bar{x}\pm s$)**

Note: The abscissa represents D0, D1, D2 and D3 respectively, and the ordinate represents VAS scores of patients at different time points (points);

The VAS scores at D0, D1, D2 and D3 were (3.94±0.66), (2.23±0.54), (1.04±0.43) and (0.38±0.12) in the OA group respectively, and were (3.97±0.64), (3.83±0.56), (1.96±0.47) and (0.86±0.41) in the RA group respectively;

* indicates a significant difference in VAS scores at D1 between the two groups of patients (t=15.663, P=0.000);

** indicates a significant difference in VAS scores at D2 between the two groups of patients (t=10.999, P=0.000);

*** indicates a significant difference in VAS scores at D3 between the two groups of patients (t=8.557, P=0.000).

### 2.5 Comparison of MBI and MMSE scores before and after treatment between the two groups

The MBI and MMSE scores of the two groups after treatment were significantly better than those before treatment (P<0.05), and the MBI and MMSE scores of the OA group after treatment were significantly better than those of the RA group (P<0.05), as shown in Table 2.

*Table 2.* **Comparison of MBI and MMSE scores before and after treatment between the two groups ( $\bar{x}\pm s$, points)**

| Group | n | MMSE | | | |
|---|---|---|---|---|---|
| | | Before treatment | After treatment | Before treatment | After treatment |
| OA group | 58 | 30.27±4.48 | 67.26±5.38 | 21.39±3.28 | 29.31±3.17 |
| RA group | 58 | 30.24±4.42 | 54.58±5.47* | 21.36±3.24 | 25.19±3.26* |

Note: The MBI and MMSE scores after treatment in both groups were significantly higher than those before treatment. * indicates the comparison between the OA group and RA group after treatment (P<0.05).

### 2.6 Comparison of SAS and SDS scores before and after treatment between the two groups of patients

The SAS and SDS scores after treatment in both groups were significantly lower than those before treatment (P<0.05), and the SAS and SDS scores of the OA group after treatment were significantly

lower than those of the RA group (P<0.05), as shown in Table 3.

*Table 3.* **Comparison of SAS and SDS scores before and after treatment between the two groups of patients ( $\bar{x}$±s, points)**

| Group | n | SAS | | SDS | |
|---|---|---|---|---|---|
| | | Before treatment | After treatment | Before treatment | After treatment |
| OA group | 58 | 61.24±5.58 | 41.14±4.82 | 58.93±6.28 | 42.38±7.49 |
| RA group | 58 | 61.28±5.62 | 44.31±4.63* | 58.98±6.19 | 48.45±7.32* |

Note: SAS and SDS scores after treatment in both groups were significantly lower than those before treatment; * indicates the comparison between the OA group and RA group after treatment (P<0.05).

**2.7 Comparison of postoperative complications between two groups of patients**

The total incidence of postoperative complications in the OA group was significantly lower than that in the RA group (P<0.05), as shown in Table 4.

*Table 4.* **Comparison of postoperative complications between two groups of patients [n (%)]**

| Group | n | Incision infection | Revision after operation | Periprosthetic fractures | Intra-articular infection | Total incidence |
|---|---|---|---|---|---|---|
| OA group | 58 | 1（1.72％） | 0（0.00％） | 1（1.72％） | 2（3.45％） | 6.90％（4/58 |
| RA group | 58 | 3（5.17％） | 2（3.45％） | 3（5.17％） | 4（6.90％） | 20.69％（12/58 |
| $X^2$ | | | | | | 4.640 |
| P | | | | | | 0.031 |

**3. Discussion**

In recent years, with the aging of population, the prevalence of OA and RA has increased year by year. The data from China Health and Retirement Longitudinal Survey show that (Justine and Richard, 2018) the prevalence of symptomatic OA in China is as high as 8.2%, with obvious regional differences. The prevalence of western region is higher than the that of eastern region. OA is a degenerative joint disease that mainly damages the articular cartilage and affects joint tissues throughout the body. RA is an immune disease with aggressive arthritis as the main symptom and pathological basis as synovitis, resulting in joint deformity and eventually loss of normal joint function (Maurizio and Elena, 2018; Janet and Matthew, 2018). Both diseases can damage patients' joints and restrict movement, so it is essential to explore effective treatment measures. TKA can eliminate knee pain, improve knee function, and correct knee deformity to achieve long-term stability. It is reported that 35-60% of OA patients choose TKA treatment. Besides, Bruce Hellman et al. (Bruce et al., 2018) pointed out in the study that the excellent and good rate of TKA treatment for RA reached 85.7%, which could effectively reduce the joint pain of patients and improve knee function.

In this study, TKA treatment was applied to both groups of patients, and it was found that the postoperative drainage and hospitalization time of the OA group were significantly better than those of the RA group. This may be related to the intra-articular synovial hyperplasia in the RA patients, which was rich in pannus. And the operation would damage the synovial membrane to induce more occult bleeding, resulting in increased drainage volume. In addition, RA patients had many basic diseases, poor tolerance to surgical trauma and slow postoperative recovery, resulting in longer hospitalization time (Hsuan-Ju et al., 2018). Pain and knee joint motion are important indicators to evaluate the degree of recovery of joint function in OA and RA patients after operation. This study showed that the KSS clinical score and KSS functional score of the OA group were significantly higher than those of the RA group 12 months after operation, and the VAS scores of the OA group at 1 month, 3 months and 12 months after operation were significantly lower than those of the RA group. Barbara Jenko et al.(Barbara et al., 2018) pointed out in the study that the VAS scores of OA patients at 3 months and 6 months after operation were (1.13±0.27) points and (0.62±0.16) points respectively, which were significantly lower than those of RA group (1.87±0.34) points and (0.84±0.23) points, presumably due to the increased pain sensitivity of RA patients caused by vascular proliferation of synovial tissues in the joints.

In addition, a large number of clinical investigations have found that knee joint diseases restrict the activity of patients, thereby affecting

their life quality, easily causing their adverse emotions, and thereby affecting treatment (Michael et al., 2018). MBI is a key index to evaluate the life quality of patients after operation. This study showed that the MBI scores of patients in both groups after treatment were significantly higher than those before treatment, suggesting that TKA can effectively improve the life quality of OA and RA patients after operation. But the MBI scores of patients in OA group after treatment were significantly higher than those in RA group, presumably due to the knee joint recovery of patients in both groups and the better recovery of knee joint function in OA patients than that in RA patients after operation. Infection is one of the major complications after TKA. This study showed that the total incidence of postoperative complications within 12 months in OA group was significantly lower than that in RA group, presumably due to the diseases or low immunity of RA patients. Therefore, hospitals should strictly abide by aseptic operation, strengthen perioperative nursing and improve immunity when carrying out TKA treatment. At the same time, the use time of antibiotics should be appropriately extended according to the recovery of patients to reduce complications and improve the therapeutic effect (Ying-Yan et al., 2018; A C D et al., 2018).

In conclusion, TKA has significant therapeutic effect in both OA and RA, but the knee joint recovery and life quality of OA patients after operation are significantly better than those of RA patients, with a lower complication rate after operation. Therefore, it is necessary to do a good job in perioperative nursing management, strengthen pain control, and actively carry out limb rehabilitation training in patients treated with with TKA.

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