

## Original Article

# Clinical efficacy of arthroscope-assisted treatment for traumatic synovitis of knee joint

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**Abstract:** Objective: With significant efficacies, arthroscope has been used in the treatment of knee joint synovitis for many years, but the effects of arthroscope-assisted treatment for traumatic synovitis of knee joint (TSKJ) still remains controversial. This study aimed to investigate the clinical efficacies of arthroscopic debridement for patients with TSKJ. Methods: One hundred and twenty patients diagnosed as TSKJ and treated in our hospital during March 2015 to March 2016 were randomly divided into two groups according to random number table: open surgery group (O group, n=60) and arthroscope-assisted open surgery group (O+A group, n=60). Before surgery, and 1, 5, 10 days after surgery, International Knee Documentation Committee (IKDC) Subjective Knee Joint Evaluation Form, American Knee Society Score (AKSS), Lysholm Knee Scoring Scale (LKSS) and visual analog scale (VAS) were adopted to score and compare preoperative and postoperative functions and pains of knee joint between the two groups respectively. Results: Before surgery, and 1, 5, 10 days after surgery, there were no significant differences in IKDC, AKSS, LKSS and VAS scores between the two groups. Postoperative IKDC, AKSS, LKSS and VAS scores of the two groups were better than those before surgery (all  $P < 0.05$ ). IKDC, AKSS and LKSS scores ( $P = 0.028$ ,  $P = 0.009$ ,  $P = 0.001$  respectively) in O+A group 10 days after surgery were higher than those in O group; while VAS score ( $P = 0.045$ ) in O+A group after surgery was lower than that in O group. Conclusion: The therapeutic effect of open surgery assisted with arthroscopic debridement for the treatment of TSKJ is better than that of open surgery.

**Keywords:** Arthroscope, open surgery, knee joint, synovitis, clinical efficacy

## Introduction

Composed of medial and lateral tibial condyles and patella, knee joint is the most complicated part in the human body. Normal synovial tissue of joint can secrete synovial fluid to lubricate the joints and nourish articular cartilage, and to dissipate heat. After knee joint injures, synovial tissue is vulnerable to invasion. Under the stimulation of inflammation, synovial tissue can not only be damaged by inflammatory factors, but also trigger knee joint pain [1]. Knee joint synovitis makes the activation of synovial cells to secrete and release many inflammatory factors, which stimulates synovial tissue hyperplasia, causing facilitation of blood vessel and erosion of cartilage tissue, leading to destruction, dissolution and fibrosis of cartilage matrix, eventually resulting in joint deformity and dysfunction [2, 3]. Therefore, it is urgent to treat traumatic synovitis of knee joint (TSKJ) in clinic.

With the continuous development of medical technology, arthroscope has played an important role in the treatment of knee joint synovial lesions with many advantages such as less complications and trauma; therefore, it is gradually applied in the treatment of related diseases clinically [4]. The manifestations of arthroscopic knee joint synovial tissue lesions are special, and arthroscopic resection of synovial tissue lesions has a certain effect on the treatment of disease, but researches have found that efficacy of open surgery of resection at knee joint synovial tissue lesions is better than that of arthroscopic surgery for the treatment of traumatic synovial tissue lesions of knee joint [5, 6]. Thus, the current effect of open surgery and arthroscopic surgery for the treatment of TSKJ is still controversial. In this study, a total of 120 patients with traumatic synovial lesions of knee joint and the changes of International Knee Documentation Committee (IKDC) Knee Joint Evaluation Form,

American Knee Society Score (AKSS), Lysholm Knee Scoring Scale (LKSS) and visual analog scale (VAS) before and after open surgery and arthroscope-assisted open surgery were observed to evaluate their therapeutic effects.

### Materials and methods

#### *Case selection and grouping*

This study was approved by the Ethics Committee of our hospital and the informed consents were obtained from the patients. One hundred and twenty patients diagnosed as TSKJ and treated in our hospital during March 2015 to March 2016 were randomized into two groups according to random number table: open surgery group (O group, n=60) and arthroscope-assisted open surgery group (O+A group, n=60). There were no restrictions on age, gender or the first surgery of patients or not.

Inclusion criterion: Patients had TSKJ.

Exclusion criteria: Patients had serious cardiovascular disease, liver disease and kidney disease; patients had blood coagulation dysfunction; patients suffered from other knee joint diseases; patients had obvious focus of infection in the whole body or local knee joint; patients' joint space was particularly narrow or even disappeared.

#### *Surgical methods*

*Open surgery group:* According to arthroscopic posterior trans-septal approach, anterior compartment, medial and lateral compartments, and posteromedial and posterolateral compartments of the knee joint were cleaned. Then the knee joint was straightened and a straight incision about 5 to 6 cm was made in the proximal patella of anterior knee joint, incised layer by layer. The quadriceps tendon was split longitudinally at 1 cm-position away from its medial margin, so as to expose the knee joint cavity. After that, the proliferative synovium of suprapatellar bursa and medial and lateral recesses were completely excised, the tourniquet was loosened and the electric coagulation was used to stop bleeding, then drainage tube was placed in the knee joint cavity. Finally, the incision was sutured layer by layer with pressured dressing.

*Arthroscope-assisted open surgery group:* After disinfection of the operation items, patients

were performed the surgery in supine position. The knee joint cavity was punctured to extract joint effusions and it was injected normal saline until it was full of the liquid. The anterolateral knee joint was inserted 4 mm-arthroscope at 30° wide-angle obliquely. And posteromedial compartment, medial and lateral recesses, intercondylar fossa, suprapatellar bursa, lateral compartment, patellofemoral joint and medial compartment of patients were examined. The nucleus pulposus forcep was used to clamp synovial tissue at the anteromedial knee joint. Synovial tissue was observed and cleared under the arthroscope. Then, normal saline was adapted to rinse the knee joint cavity and elastic bandage was used to bandage the wound after surgery.

Pressure dressing was performed to surgical parts of all patients after surgery. The whole affected limb was bandaged with elastic bandage and it was with indwelling drainage tube for about 24 to 48 hours. The patients were asked to do isometric contraction of quadriceps femoris, straight leg raise and ankle pump exercises as soon as possible. Patients started passive exercise three days after surgery and the affected limb could bear part load to do off-bed activity with the help of two walking sticks after it could uplift beyond bed surface autonomously. Affected limb could bear load completely four weeks after surgery and the drainage tube was removed two weeks after surgery.

#### *Follow-up and observation indicators*

One month after discharge from hospital, follow-up was performed every three months. Observation indicators of follow-up included IKDC, AKSS, LKSS and VAS scores.

*IKDC:* IKDC Subjective Knee Joint Evaluation Form was used for assessing injury and defect of anterior cruciate ligament. The scores range from 0 to 100 and above 60 is good [7].

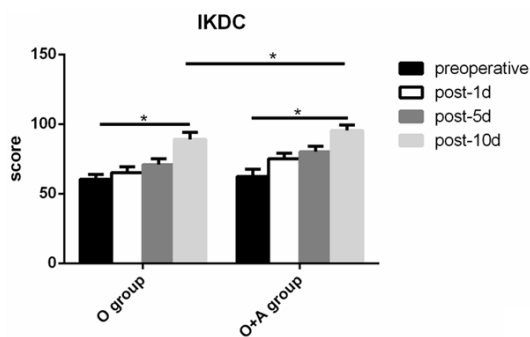
*AKSS:* AKSS consists of knee joint scoring and function scoring. Knee joint scoring is composed with pain, mobility and stability; function scoring includes walking ability evaluation and ability evaluation to go upstairs and downstairs, which has been widely used in the evaluation of patients with total knee replacement before and after surgery since it was put forward in

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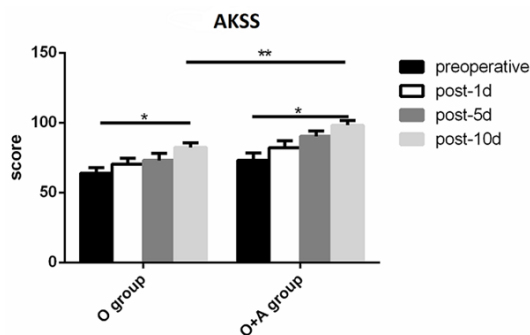
**Table 1.** General information

Group	O group (n=60)	O+A group (n=60)	P
Gender (male/female)	35/25	36/24	0.853
Age	45.7±4.3	47.2±2.8	0.590
BMI	23.1±2.1	22.8±2.9	0.678
Hypertension	14	12	0.196
Diabetes mellitus	8	9	0.069
Surgical time (min)	42.4±4.2	40.7±6.2	0.374

Note: O group, open surgery group; O+A group, arthroscope-assisted open surgery group; BMI, body mass index. There were no significant differences in gender, age, basal disease and course of disease of treatment ( $P>0.05$ ).



**Figure 1.** Comparison of IKDC scores between O group and O+A group before and after surgery. O group, open surgery group; O+A group, arthroscope-assisted open surgery group; \* $P<0.05$ .



**Figure 2.** Comparison of AKSS scores between O group and O+A group before and after surgery. O group, open surgery group; O+A group, arthroscope-assisted open surgery group; \* $P<0.05$ , \*\* $P<0.01$ .

1989 [8]. The total score is 100. The higher the score is, the better knee joint function will be.

**LKSS:** LKSS is a condition-specific scoring for the evaluation of knee joint ligament injury [9]. The total score is 100: no limp, 5 scores; no support, 5 scores; no locking, 15 scores; stabil-

ity, 25 scores; no swelling, 10 scores; no problem of stair-climbing, 10 scores; no problem of squatting, 5 scores; no pain, 25 scores. The higher the score is, the better the knee joint ligament function presents.

**VAS:** VAS is used for pain assessment. It ranges from 0 to 10 scores: no pain, 0 score; the most unbearably acute pain, 10 scores [10].

### Statistical methods

SPSS17.0 statistical software was adopted for data analysis. Mean  $\pm$  SD was used to present data results; repeated measurements of variance analysis were used for the data comparisons of several time points before and after surgery. Count data was expressed by rate (%) and Chi-square test was adopted for the comparison of the two groups.  $\alpha=0.05$  was the significant inspection standard.

### Results

#### General information

There were no statistical differences in general information between the two groups before surgery ( $P>0.05$ ). See **Table 1**.

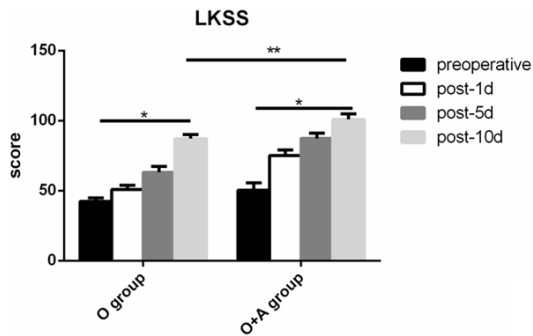
#### Changes of IKDC scores

The preoperative IKDC scores in the two groups were 60.4 (O group) and 62.3 (O+A group), while IKDC scores 1, 5, and 10 days after surgery were 65.2 and 75.2, 75.3 and 80.25, 89.1 and 95.4 respectively. There were significant differences of IKDC scores in O group and O+A group between before surgery and 10 days after surgery ( $P=0.032$ ,  $P=0.012$  respectively), and the IKDC score of O+A group 10 days after surgery was higher than that of O group ( $P=0.028$ ). See **Figure 1**.

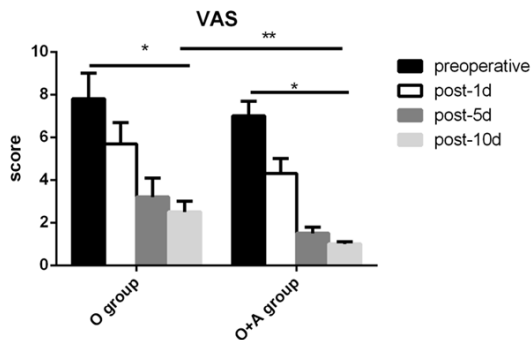
#### Changes of AKSS scores

The preoperative AKSS scores in the two groups were 63.9 (O group) and 70.2 (O+A group), while AKSS scores 1, 5, and 10 days after surgery were 70.3 and 82.1, 72.3 and 90.25, 82.3 and 98.2 respectively. There were significant differences of AKSS scores in O group and O+A group between before surgery and 10 days after surgery ( $P=0.039$ ,  $P=0.008$  respectively), and the AKSS score of O+A group 10 days after surgery was higher than that of O group ( $P=0.009$ ). See **Figure 2**.

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**Figure 3.** Comparison of LKSS scores between O group and O+A group before and after surgery. O group, open surgery group; O+A group, arthroscope-assisted open surgery group; \* $P < 0.05$ , \*\* $P < 0.01$ .



**Figure 4.** Comparison of VAS scores between O group and O+A group before and after surgery. O group, open surgery group; O+A group, arthroscope-assisted open surgery group; \* $P < 0.05$ , \*\* $P < 0.01$ .

### Changes of LKSS scores

The preoperative LKSS scores in O group and O+A group were 42.5 and 43.6 respectively, while LKSS scores 1, 5, and 10 days after surgery were 50.9 and 75.2, 73.2 and 87.3, 87.2 and 90.9 respectively. There were statistical differences of LKSS scores in O group and O+A group between before surgery and 10 days after surgery ( $P = 0.042$ ,  $P = 0.027$ ), and the LKSS score of O+A group 10 days after surgery was higher than that of O group ( $P = 0.001$ ). See **Figure 3**.

### Change of VAS scores

The preoperative VAS scores in O group and O+A group were 7.8 and 7.0 respectively, while VAS scores 1, 5, and 10 days after surgery were 5.7 and 4.3, 3.2 and 1.5, 2.5 and 1.0 respectively. There were significant differences of VAS scores in O group and O+A group between

before surgery and 10 days after surgery ( $P = 0.002$ ,  $P = 0.001$ ), and the VAS score of O+A group 10 days after surgery was lower than that of O group ( $P = 0.045$ ). See **Figure 4**.

### Discussion

TSKJ is a serious threat to human health. Arthroscopic debridement is increasingly widely used in clinic because it can increase efficacy effectively, relieve patient's pain and improve joint function. Compared with open surgery, its advantages still need to be further explored.

IKDC was used in this study. The average scores of preoperative IKDC in O group and O+A group were 60.4 and 62.3 respectively, while those of postoperative IKDC were 75.3 and 80.25. The two groups both had significant differences in IKDC scores before and after surgery. In addition, there were significant differences of IKDC score between O group and O+A group after surgery. These results were consistent with the study outcomes of Liu et al., and they found that IKDC score of O+A group was higher than that of O group, indicating that arthroscope-assisted treatment for TSKJ had more obvious efficacies [11].

Also, AKSS was used in this study. The average AKSS scores in O group and O+A group before surgery were 63.9 and 70.2 respectively, while those after surgery were 72.3 and 90.25. There were significant differences of AKSS scores before and after surgery in O group and O+A group, and the two groups had differences in AKSS scores after surgery, which was consistent with the study outcomes of Jain et al. They found that AKSS and LKSS scores of O+A group were higher than those of O group, while VAS score of O+A group was lower than that of O group, suggesting that the pain, mobility and stability of arthroscope-assisted treatment for TSKJ after surgery were more obvious [12].

Long-term curative effect of joint synovitis after surgery depends on exhaustive cleaning degree of synovial tissue after surgery. A full synovial at most was excised in this study, only left the fibrous layer of articular capsule. To maximally clean synovial tissue, this experiment combined open surgery with arthroscopic surgery to fully expose knee joint cavity; therefore, it had better curative effect after surgery. And the AKSS, LKSS and VAS scores of arthroscope-

assisted open surgery were better than those of only open surgery.

Although arthroscope is better to expose joint cavity with beneficial efficacies, it still has some limitations [13, 14]. Studies found that some patients' improvement of self-conscious symptoms wasn't obvious after they received combined treatment, and curative effect didn't meet expectation and even more serious symptoms after surgery appeared [15, 16]. Disease often affects the functional structure, leading to a difficulty to excise the synovium completely, which is the main reason for recurrence, especially diffuse type [17].

It was found that the prognosis of arthroscopic surgery was related to patients' physiological and psychological statuses, physiological function and daily movement function improved obviously, while the improvement of psychological function was not clear. Although the symptoms of many patients had improved significantly and the function had been restored, the psychological barriers were difficult to eliminate. In some degree, their activities were restricted and they were afraid to do physical exercise, especially older people. Only part of the young patients could break through their psychological barriers and adhere to their rehabilitation exercise [18-20]. These were also consistent with results of these evaluation scores in this study.

However, the number of researchers included in the study was insufficient. More patients with TSKJ need to be included for statistics and analysis of the above evaluation scores in the future and more evaluative indicators for joint function should be collected in order to conduct a more comprehensive analysis of the efficacies of arthroscope-assisted open surgery, including postoperative drainage quantity, postoperative length of stay, postoperative knee flexion range of motion, etc.

In conclusion, the application of arthroscope-assisted open surgery for patients with TSKJ had significant efficacies with obviously postoperative recovery of function, whose effect was better than that of open surgery.

### Disclosure of conflict of interest

None.

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