Arthroscopic Lysis of Adhesions for Stiff Total Knee Arthroplasty

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abstract

The goal of this study was to evaluate the efficacy of arthroscopic lysis of adhesions after total knee arthroplasty (TKA) in improving range of motion (ROM) and providing an improvement in knee function. The authors retrospectively examined 19 patients who underwent arthroscopic lysis of adhesions following TKA due to poor ROM. The criterion for lysis was the inability to flex to 90° at 3 months. All patients were followed for at least 2 years after lysis. Patient demographics, postoperative and follow-up ROM, number of prior surgeries, Knee Society Scores, and Western Ontario and McMaster Universities Arthritis Index (WOMAC) functional scores were collected. Average ROM increased from 75.37° preoperatively to 98.95° postoperatively. The authors found an association between preoperative knee score and change in ROM between prearthroscopic lysis and ROM at final follow-up (P=.0188). When the authors examined the relationship between patient body mass index (BMI) and change in ROM, they found that patients with a BMI higher than 30 kg/m² had a change of 26.44° compared with patients with a BMI lower than 30 kg/m², who had a change of only 8.75°. A strong association was found between patient height and change in ROM and final ROM achieved (P=.0062 and .0032, respectively). The authors report a successful outcome among study patients. Furthermore, they found an association between patient height, BMI, and preoperative knee score and the improvement achieved after arthroscopic lysis of adhesions following TKA. The current study’s results are comparable with those of published results. The authors recommend arthroscopic lysis of adhesions as a treatment option for stiff knees after TKA that fails after at least 3 months of nonoperative treatment.

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Arthofibrosis of the knee can be debilitating to patients who have undergone total knee arthroplasty (TKA). It occurs in 3% to 4% of patients undergoing TKA and can be a painful and limiting complication where excess scarring of the joint causes dense fibrous connective tissue buildup and decreases range of motion (ROM). Stiffness of the knee joint and limited flexion can interfere with the patient’s activities of daily living. Hutchinson et al defined knee stiffness requiring surgical intervention as having a knee flexion contracture of 15° or knee flexion of less than 75°. 

Nonoperative treatment options include pain management, physical therapy, and manipulation under anesthesia. When these options fail, operative interventions, such as lysis of adhesions (open and arthroscopic), explanation, and revision surgery, are recommended. Arthroscopic lysis of adhesions typically involves the release of adhesions in the suprapatellar pouch and notch combined with lateral and medial releases at the gutters and removal of any loose bodies and soft tissue impingement.

Adhesions can form between the capsule and femoral condyles as well as in the anterior interval, the infrapatellar fat pad, and the prepitibial recess. Posterior capsule adhesions are often found when there is a noticeable loss of extension. They are more difficult to address arthroscopically; therefore, flexion contractions may not benefit from arthroscopic lysis of adhesions. Arthroscopic lysis of adhesions allows the surgeon to excise the fibrotic tissue and improve flexion. Nonetheless, current studies examining arthroscopic lysis of adhesions have reported varying levels of improvement in patients’ knee ROM. Relatively few studies have been published on the surgical outcome following arthroscopic lysis of adhesions. Studies comparing the total ROM gained from arthroscopic lysis with gains achieved after manipulation under anesthesia have shown little difference. Mean gain in ROM from manipulation under anesthesia is reported to be between 30° and 47° compared with approximately 30° in from 50% to 90% of patients undergoing arthroscopic lysis.

The goal of the current study was to evaluate the efficacy of arthroscopic lysis of adhesions after TKA in improving ROM and providing an improvement in knee function. The authors present a single surgeon’s experience with arthroscopic lysis of adhesion for the treatment of stiff TKA. The authors hypothesized that the results with arthroscopic lysis would be comparable with published results and that no correlation would exist with respect to patients’ documented preoperative Knee Society Scores and Western Ontario and McMaster Universities Arthritis Index (WOMAC) functional scores, body mass index (BMI) higher than 30 kg/m², or height.

**Materials and Methods**

This retrospective observational study was performed after institutional review board approval. The authors reviewed the records of all patients who had undergone lysis of adhesions due to poor ROM after primary THA by a single surgeon (W.F.) between 2000 and 2009. The criterion for undergoing lysis was a patient’s inability to flex the knee to 90° at 3-month follow-up, extension deficits greater than 10° (flexion contractures), or pain associated with motion after failure to achieve ROM gains with physical therapy. All patients were followed for at least 1 year after arthroscopic lysis of adhesions to evaluate progression of knee ROM. Follow-up assessments included radiographic and clinical evaluations. Patient demographics, preoperative and follow-up ROM, number of prior surgeries, Knee Society Scores, and WOMAC functional scores were collected.

Patients’ clinical records were reviewed, and demographic data were recorded, including age, sex, BMI, time since initial surgery, number of prior surgeries, and functional knee scores including pre- and postoperative ROM.

Range of motion was assessed by total arc of ROM and by change in ROM achieved between preoperative and follow-up values (delta change of ROM). Knee function was assessed by the Knee Society Score and the WOMAC functional score, which attempt to establish a baseline standard for patients that can help determine whether stiffness, pain, and ROM have improved with the lysis procedure.

**Surgical Technique**

All arthroscopies were conducted under general anesthesia in an outpatient setting. The arthroscope was introduced into the intracondylar notch from an anterolateral portal, and a vaporizer was introduced through an anteromedial portal while the knee was in a midflexion position. First the granulation tissue connecting the posterior cruciate ligament and Hoffa’s fat pad was removed to gain visibility of the femoral component. The vaporizer was gradually brought medial and lateral to clear the front aspect of the polyethylene liner before the medial and lateral gutters were cleared. This allowed access to the peripatellar tissue and the suprapatellar pouch (Figure 1). The suprapatellar pouch was cleared by connecting the medial and lateral gutters approximately 8 to 10 cm proximal to the anterior femoral flange of the implant. An inspection of the components, specifically of the implant-cement-bone interfaces, was performed. The polyethylene liner surfaces were inspected, followed by thorough irrigation of the knee to remove all remaining free bodies and debris. Finally, the arthroscope was removed, and gentle knee manipulation was performed. Maximal knee flexion was documented by photographs (Figure 2). Wounds were closed, and sterile dressings were applied.

Postoperatively, all patients were started on a continuous passive motion machine at home for a minimum of 2
hours per day. Dressings were changed 1 week postoperatively, and patients started outpatient physical therapy 1 to 2 weeks postoperatively, twice a week for 4 to 6 weeks.

Statistical analyses were performed with the use of correlation tests and the Wilcoxon rank sum test. Spearman correlation coefficients were reported. All statistical analyses were performed using SAS version 9.2 statistical software (SAS Institute, Inc, Cary, North Carolina). A P value less than .05 was considered significant.

RESULTS

Nineteen knees in 19 patients that matched the inclusion criteria were identified and included in this study. The study cohort included 5 men and 14 women with an average age of 60.53 years (range, 50 to 89 years). Minimum follow-up was 1 year (average, 21.05 months [range, 12 to 53 months]). Eighteen TKA were a cruciate-retaining design and 1 was posterior-scarifying (this distribution did not allow for analysis). All patients had less than 90° flexion prior to arthroscopy, and all underwent at least 1 full course of physical therapy prior to undergoing arthroscopic lysis of adhesions. Four patients had flexion contractions: 2 had 3° of flexion contraction and 2 had 10° of flexion contraction. Two patients had undergone multiple surgeries prior to consideration for arthroscopic lysis (both had undergone revision TKA due to failure of the primary TKA implant). No patient had visible gross component malposition on imaging.

All 19 patients had limited flexion, and 16 had no severe pain during knee flexion. Only 2 (10.5%) of 19 patients did not observe an increase in flexion after 2-year follow-up.

Average ROM increased from 75.37° (range, 45° to 90°) preoperatively to 98.95° (range, 67° to 120°) postoperatively. Average gain in ROM achieved at final follow-up was 23.57° (range, -5° to 70°).

A strong association was found between preoperative knee scores and change in ROM between preoperative and final follow-up values (P=.0188). Patients with a BMI higher than 30 kg/m² were also more likely to benefit from lysis of adhesions, gaining an average of 26.44° (range, 8° to 55°) in ROM compared with an average increase of 8.75° (range, -5° to 35°) in patients with a BMI lower than 30 kg/m². A strong association was found between patient height and change in ROM as well as final ROM achieved. An increase in patient height was associated with greater gains in ROM following arthroscopic lysis of adhesions (P=.0062 and .0032, respectively) (Table).

An association was found between preoperative knee scores and change in ROM between preoperative and final follow-up values (P=.0188).

An association was found between preoperative knee scores and number of prior knee surgeries, and between the time
from primary TKA to arthroscopic lysis of adhesions (P= .0259 and .0030, respectively) (Table).

Four of the 19 patients underwent revision TKA following arthroscopic lysis of adhesions, including 1 patient with a tibial exostectomy and 3 patients undergoing revision TKA for stiffness and lack of satisfactory ROM. Functional satisfactory results were achieved in 18 of 19 patients.

**Discussion**

The authors studied the clinical outcomes of patients following stiffness and limited ROM after TKA based on preoperative knee scores, knee ROM, and patient height, weight, and BMI. The authors hypothesized that the results with arthroscopic lysis would be comparable with published results and that no correlation would exist with respect to patients’ documented preoperative knee scores, BMI higher than 30 kg/m², or height.

Several techniques, including quadricepsplasty, manipulation under anesthesia, open lysis of adhesions, and arthroscopic lysis of adhesions, have been examined for their ability to increase flexion in patients with limited ROM. Two studies reported a mean gain in ROM from 18.5° to 60°. However, most of the studies included small numbers of patients. Considerable variation between patient outcome evaluation and reporting makes it hard to adequately compare the results of different techniques used in the literature. Furthermore, arthroscopic lysis of adhesions may not be able to correct flexion contractions due to the difficulty in reaching the posterior capsule adhesions; lack of full extension may cause disability and gait disturbances.

The current authors report a significant increase in mobility and ROM, with an average improvement of 21°. In the current study, 89.5% of patients maintained their ROM at final follow-up. Preoperative knee scores were found to be associated with a change in ROM after arthroscopic lysis of adhesions (P=.0188). The authors found that BMI is a significant predictor of improvement in ROM, with patients with a BMI higher than 30 kg/m² having a significantly better improvement in ROM (average, 26°) compared with patients with a BMI less than 30 kg/m² (average, 9°). The authors postulate that patients with a higher BMI have a greater potential for gains in ROM following arthroscopic lysis of adhesions due to the limited ROM they exhibit. Furthermore, the authors observed that patients with a higher BMI have limited flexion due to their body habitus, which may cause a mechanical block to deep flexion. Women may be overrepresented in this subgroup due to different weight distribution that is more common in the lower extremities compared with men. A strong association was also found between an increase in a patient’s height and improvement in knee ROM after arthroscopic lysis of adhesions (P<.01).

No previous study examining improved ROM after arthroscopic lysis of adhesions reported an association between patient height, knee scores, and BMI. This study had some limitations. First, this was a retrospective design of a cohort, without a control group undergoing manipulation under anesthesia. Second, the cohort was small and the follow-up relatively short. Also, the indication for arthroscopic lysis of adhesions is variable, and there are no standardized indications for surgery. Some patients had their initial procedures performed by a surgeon other than the senior author. Clear indications, such as ROM less than 90° at a certain time point (eg, 12 weeks postoperatively), would allow a report on a more homogeneous cohort. However, in an academic clinical practice, more patients are referred for stiffness and limited ROM at any time postoperatively, and the authors’ reported cohort includes such cases.

**Conclusion**

The authors report a successful outcome in patients following arthroscopic lysis of adhesions after TKA and note an association between patient height, BMI, and preoperative knee scores. This study’s results are comparable with those of other published results. The authors recommend arthroscopic lysis of adhesions as a
treatment option for stiff knees after TKA that have failed at least 3 months of non-operative treatment.

REFERENCES