

Role of Arthroscopic Surgery in Degenerative Knees with Mechanical Symptoms

Abstract

Background: This study was conducted to evaluate functional outcome in patients undergoing/underwent arthroscopic surgery for degenerative knees with mechanical symptoms or acute exacerbation of symptoms, not amenable to conservative measures. **Materials and Methods:** This was a longitudinal type of study (prospective and retrospective). For the prospective cohort, followup was done at an interval of 2 weeks, 6 weeks, 6 months and 1 year to record visual analog scale (VAS), International Knee Documentation Committee (IKDC), and short form-8 (SF-8) scores. For the retrospective cohort, hospital records were studied to record the preoperative VAS score. Preoperative IKDC and SF-8 scores were recorded at final followup based on recall method (patient’s memory). Furthermore, postoperative VAS, IKDC, and SF-8 scores at final followup were recorded. **Results:** There were a total of 46 knees (28 retrospective and 18 prospective) in 44 patients. The mean age was 52.34 ± 11.73 years. There were 28 female knees and 18 male knees. The mean followup of patients in the retrospective cohort was 55 months (range: 13–126 months), whereas all patients in prospective cohort completed the minimum followup of 1 year. The improvements in VAS, IKDC, and SF-8 were statistically significant. Forty-one cases were successful and five cases were failure. All successful patients (41 cases) said “yes” and all failure cases (05) said “no” to the question-“If given a choice, would you still like to get the same surgery done for the same problem??”. There was one complication deep venous thrombosis. **Conclusion:** We recommend arthroscopic surgery in patients with degenerative knees, with mechanical symptoms and acute exacerbation of symptoms, not amenable to conservative measures.

Keywords: Acute exacerbation of symptoms, arthroscopic surgery, degenerative knees, mechanical symptoms

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Introduction

Degenerative knee disease (osteoarthritis) is a common clinical condition in the middle-aged population.^{1,2} In the Asian population, the practice of squatting is common, which is reported to be associated with increased risk of knee osteoarthritis.³ Symptoms of degenerative knee disease may have a profound effect on the quality of life, both physically and psychologically. The knees of these patients often have degenerative changes in cartilage, meniscus, and subchondral bone.³

Several studies have supported the role of arthroscopic surgery in degenerative knee disorders.⁴⁻⁸ Arthroscopic techniques suggested in these studies include lavage, debridement, abrasion arthroplasty, subchondral penetration procedures (drilling and microfractures), laser/thermal

chondroplasty, etc. However, there is also the availability of literature suggesting that there is no benefit of arthroscopic surgery in degenerative knees.⁹⁻¹⁶ Thorlund *et al.* in their meta-analysis on the role of arthroscopic surgery in degenerative knees, concluded that knee arthroscopy is associated with harms and should not be practised in the middle-aged or older patients with knee pain, with or without the signs of osteoarthritis. The age of patients in studies included in this meta-analysis ranged from 18 to 75 years.¹⁵ However, Kise *et al.* in their study reported no serious adverse events or harms occurring with arthroscopic surgery; although, they reported equivocal results with arthroscopic partial meniscectomy and exercise therapy for degenerative meniscal tears.¹⁷ On the contrary, Gauffin *et al.*, in their randomized controlled trial, reported greater pain relief 1 year after partial meniscectomy compared with nonsurgical treatment.⁷ Furthermore,

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there have been concerns raised against the methodology and data collection of the randomized controlled trials which discourage performing arthroscopic surgery in degenerative knees.¹⁸ Hence, the role of arthroscopic surgery in degenerative knees is still a topic of debate.

We, at our center have been performing arthroscopic knee surgery in patients of degenerative knee disorders with mechanical symptoms (complaint of locking) and acute exacerbation of symptoms (recent episode of effusion and pain in degenerative knee), not amenable to conservative measures (painkillers, quadriceps strengthening exercises, weight reduction, avoiding squatting, sitting cross-legged, and climbing stairs), with satisfactory results for the past 15 years. A blanket statement of discouraging arthroscopic surgery in all cases of degenerative knee disorders might be too strong a statement and hence, requires further investigation.

The current study was designed to evaluate the functional outcome in patients undergoing/underwent arthroscopic surgery for degenerative knees with mechanical symptoms and acute exacerbation of symptoms, not amenable to conservative measures.

Materials and Methods

This was a hybrid design of study (prospective evaluation of a retrospective cohort, $n = 28$ and a prospective cohort, $n = 18$). The study was registered with Clinical Trials Registry of India, (CTRI/2017/10/010100).

Patients in retrospective cohort were included based on a thorough review of hospital records. Patients who had undergone arthroscopic surgery for degenerative knees in the past 15 years (since 2003) were enrolled in the study.

Patients in the prospective cohort were recruited from June 2015 to December 2016 and were followed up for a minimum period of 1 year.

- All patients with age >35 years (either males or females) with degenerative knee disorder with mechanical symptoms and acute exacerbation of symptoms, not amenable to conservative measures were included in the study. Those excluded from the study included patients with prior history of trauma to the same knee, patients with any prior surgical procedure done on the same knee, patients not willing to participate in the study, patients who are psychiatrically moribund and unable to respond, patients with chronic inflammatory knee disorders, patients with severe osteoarthritis (Kellgren–Lawrence Grade IV), with flexion or varus deformity clinically and candidates for knee arthroplasty.

Intra-operative findings were noted: meniscal tears, chondral damage (Outerbridge grading¹⁹), osteophytes, loose bodies, and hypertrophied synovium. Arthroscopic procedure performed included arthroscopic lavage,

debridement, meniscectomy, microfractures, synovectomy, cheilectomy (where indicated). The postoperative protocol included ice application, static quadriceps exercises, full knee bending, and full weight bearing walking from postoperative day 1.

For the prospective cohort, followup was done at an interval of 2 weeks, 6 weeks, 6 months, and 1 year. Pain was assessed using visual analog scale (VAS).²⁰ Functional outcome was assessed using the International Knee Documentation Committee (IKDC) score.²¹ Quality of life was assessed using the Short Form-8 (SF-8) questionnaire.²²

For the retrospective cohort, hospital records were studied thoroughly to record the preoperative VAS score. Patients were called up for final followup. Since preoperative IKDC and SF-8 scores were not available in the indoor patient records, these were recorded at final followup based on recall method (patient's memory). VAS, IKDC, and SF-8 at final followup were recorded. All the patients in both the cohorts were asked a question at final followup: "If given a choice, would you still like to get the same surgery done for the same problem?"

VAS score was divided into the following types: 0–30 (mild pain), 31–60 (moderate pain), 61–90 (severe pain), and 91–100 (very severe pain). Failure of the surgery was defined when the patient reported a VAS score of >30 during followup or underwent arthroplasty within 1 year of surgery.

Statistical analysis

Quantitative data were presented as mean \pm standard deviation normality of data was checked by the Kolmogorov–Smirnov tests of normality. For skewed data or scores, Mann–Whitney test for two groups was applied. For normally distributed data, two groups were compared using independent *t*-test. Proportions were compared using the Chi-square or Fisher's exact test, depending on their applicability. All the statistical tests were two-sided and performed at a statistical significance level of $\alpha = 0.05$. The analysis was performed using IBM Statistical Package for the Social Sciences 22.0.

Results

There were a total of 46 knees (28 retrospective and 18 prospective) in 44 patients. Mean age was 52.34 ± 11.73 years. There were 28 female knees and 18 male knees. Two patients (one male and one female) had undergone surgery in both the knees, but at different time intervals. Mean age of male knees was 53.11 ± 12.39 years, the whereas mean age of female knees was 51.85 ± 11.49 years. The mean followup of patients in the retrospective cohort was 55 months (range 13–146 months). All patients in prospective cohort completed the minimum followup of 1 year.

Outcome of surgery

Forty-one cases were successful. Five patients went into failure. Out of five failures, two patients underwent total knee replacement within a year of surgery (both males). Three patients had VAS score >30 at 12 months of followup (two males and one female). No patient underwent repeat arthroscopic surgery.

There was one complication. One female patient, aged 75 years, in prospective cohort, suffered from postoperative deep venous thrombosis (DVT) and was managed successfully by medical management.

All the successful patients (41 cases) said “yes” and all the failure cases (05) said “no” to the question-“If given a choice, would you still like to get the same surgery done for the same problem??”

Age distribution

Distribution of patients according to different age groups (in retrospective and prospective cohorts) is summarized in Table 1.

Visual analogue scale score

VAS score, preoperatively and at mean followup for the retrospective cohort was 85.9 ± 16.16 and 11.20 ± 13.18 , respectively. VAS score, preoperatively and at 12 months of followup for the prospective cohort was 71.76 ± 25.06 and 17.18 ± 19.66 , respectively. The decrease in VAS score is statistically significant in both the retrospective ($P < 0.0001$) and prospective ($P < 0.0001$) cohorts.

International knee documentation committee score

The IKDC score, preoperatively and at mean followup for the retrospective cohort was 15.9 ± 11.14 and 61.26 ± 12.48 , respectively. IKDC score, preoperatively and at 12 months of followup for the prospective cohort was 31.85 ± 13.13 and 57.9 ± 16.89 , respectively. The increase in IKDC score is statistically significant in both the retrospective ($P < 0.0001$) and prospective ($P < 0.0001$) cohorts.

Short form-8 score

The SF-8 score is divided into the physical component score (PCS) and mental component score (MCS). PCS, preoperatively and at mean followup for the retrospective cohort were 39.6 ± 18.17 and 90.84 ± 15.39 , respectively. MCS, preoperatively and at mean followup for the retrospective cohort were 57.86 ± 17.68 and 75.13 ± 13.71 respectively. The increase in PCS and MCS score for retrospective cohort is statistically significant. ($P < 0.0001$ and <0.0001 , respectively).

PCS, preoperatively and at 12 months of followup for the prospective cohort were 37.65 ± 14.52 and 66.25 ± 17.03 , respectively. MCS, preoperatively and at 12 months of followup for the prospective cohort were 65.07 ± 17.55

and 79.29 ± 10.13 , respectively. The increase in PCS and MCS score for prospective cohort is statistically significant. ($P < 0.0001$ and 0.0053 , respectively).

Additional variables were also studied to find out their association with the outcome of surgery.

Association with body mass index

- There is no association between body mass index (B.M.I) and initial pain (VAS score) at presentation. Thus, normal B.M.I patients suffered from the disease similar to the overweight patients ($P = 0.05$) [Table 2]
- The mean BMI in successful and failure cases was 26.83 ± 3.5 and 27.78 ± 1.81 , respectively. The mean BMI is statistically comparable in both successful and failure cases ($P = 0.555$). Hence, the success or failure of arthroscopic surgery did not depend upon B.M.I of the patient; although, all five cases of failure were in the overweight category (B.M.I > 25.0).

Association with diabetes mellitus

Eight patients had diabetes mellitus, of which only one had a failure of surgery. There was no statistically significant association of outcome of surgery with diabetes mellitus ($P = 0.78$).

Association with mechanical symptoms

- Patients with/without mechanical symptoms were comparable in terms of preoperative pain [Table 3]
- Patients with/without mechanical symptoms were comparable in terms of age [Table 4]

Table 1: Age distribution

Age group (years)	n (retrospective cohort)	n (prospective cohort)
35-44	8	4
45-54	11	5
55-64	4	5
65-74	5	2
75-84	-	2
Total	28	18

Table 2: Association between body mass index and initial pain (visual analogue scale score) at presentation

VAS	BMI		Total
	<25	>25	
≤60 (%)			
n (percentage within BMI)	1 (7.1)	11 (34.4)	12 (26.1)
Percentage within VAS	8.3	91.7	100.0
>60 (%)			
n (percentage within BMI)	13 (92.9)	21 (65.6)	34 (73.9)
Percentage within VAS	38.2	61.8	100.0
Total (%)			
n (percentage within BMI)	14 (100)	32 (100.0)	46 (100.0)
Percentage within VAS	30.4	69.6	100

BMI=Body mass index, VAS=Visual analogue scale

- Patients with/without mechanical symptoms were comparable in terms of BMI [Table 5]
- Patients with/without mechanical symptoms were comparable in terms of improvement in the SF-8 score [Table 6].

Discussion

Arthroscopic surgery was successful in 41 out of 46 cases. The improvements in VAS, IKDC and SF-8 were statistically significant. All the successful patients agreed to undergoing the same procedure again, if given a choice, whereas the five failure cases did not want this surgery done again. Studies which discourage the role of arthroscopic surgery in degenerative knees have not commented upon patient selection.⁹⁻¹⁶ The present study demonstrates that arthroscopic surgery has a place in the spectrum of treatment modalities for osteoarthritis knee, especially in patients with mechanical symptoms and acute exacerbation of symptoms, not amenable to conservative measures.

Table 3: Relation between mechanical symptoms and preoperative visual analogue scale score

Mechanical symptoms	Preoperative VAS		Total	P
	n (percentage age within VAS)			
	Upto 60	Above 60		
Absent (%)	5 (41.7)	13 (38.2)	18 (39.1)	0.548
Present (%)	7 (58.3)	21 (61.8)	28 (60.9)	
Total (%)	12 (100.0)	34 (100.0)	46 (100.0)	

VAS=Visual analogue scale

Table 4: Relation between mechanical symptoms and age

Mechanical symptoms	Age (years)		Total	P
	n (percentage within age)			
	<60	>60 years		
Absent (%)	12 (37.5)	6 (42.9)	18 (39.1)	0.490
Present (%)	20 (62.5)	8 (57.1)	28 (60.9)	
Total (%)	32 (100)	14 (100.0)	46 (100.0)	

Table 5: Relation between mechanical symptoms and body mass index

Mechanical symptoms	BMI		Total (%)	P
	n (percentage age within BMI)			
	<25.0	>25.0		
Absent	5 (35.7)	13 (40.6)	18 (39.1)	0.51
Present	9 (64.3)	19 (59.4)	28 (60.9)	
Total	14 (100.0)	32 (100.0)	46 (100.0)	

BMI=Body mass index

Table 6: Comparison of improvement in short form-8 score in patients with/without mechanical symptoms

Components of SF-8	Mechanical symptoms absent (n=17)	Mechanical symptoms present (n=27)	P
Improvement in MCS	20.8±20.7	13.1±12.9	0.137
Improvement in PCS	24.2±19.7	55.8±27.9	0.319

MCS=Mental component score, PCS=Physical component score

Several complications have been reported with arthroscopic surgery. These include DVT, infection, pulmonary embolism, and death. These complications have been labeled as the harms associated with this surgery, hence, calling for its discontinuation.¹⁵ In this study, there was one complication. One female patient, aged 75 years, in prospective cohort, suffered from postoperative DVT and was managed successfully by medical management. Kise *et al.* in 2016 also reported no serious adverse events in a 2 year followup study comparing exercise therapy and arthroscopic surgery.¹⁷ In addition, every surgical procedure, minor or major, is associated with its own share of complications and it is advisable to weigh the risks and benefits rather than discrediting a procedure altogether, which has stood the test of time.

The presence of mechanical symptoms has been cited as a predictor of success for this surgery.²³ In this study, we performed this procedure in patients with mechanical symptoms or acute exacerbation of symptoms, not amenable to conservative measures. The improvement experienced in patients with/without mechanical symptoms was similar. Hence, we suggest that arthroscopic surgery in degenerative knees should be done in cases with acute exacerbation of symptoms, not amenable to conservative measures, as well as in those with the the presence of mechanical symptoms.

It has been reported in the literature that male patients with mechanical symptoms have a better outcome as compared to female patients without mechanical symptoms.¹⁸

Young patients are also considered as predictors for good outcome.²⁴ In our study, we did not find any association of outcome of surgery with age.

Losing weight is suggested as a lifestyle modification in degenerative knees.²⁵ Hence, the logical understanding predicts that overweight individuals should have a lesser chance of success of this surgery. Although, all five cases of failure fell under the overweight category (B.M.I >25.0), the mean BMI of successful and failure cases in our study was statistically comparable. It might be due to a small sample size in the current study. There is no study in literature which has studied the outcome of arthroscopic surgery in degenerative knees with B.M.I of individuals.

In this study, we did not find any association of outcome of surgery with diabetes. There is no study in literature which has studied the outcome of arthroscopic surgery in degenerative knees with diabetes.

In the Asian population, squatting and sitting cross-legged are social obligations. These activities are not possible

following standard total knee replacement.²⁶ Hence, preserving the native knee is desired wherever possible. No doubt arthroplasty is the gold standard for advanced stage osteoarthritis knee; nevertheless, it is a major surgery with its own set of complications.²⁷ Moreover, it is an expensive surgery for a common man, especially in developing countries. Hence, it should be reserved for severe osteoarthritis.

Since the benefits of arthroscopic surgery in the current study outweigh the harms and complications significantly, we strongly recommend that this surgery must be considered as one of the treatment modalities in the surgical management of degenerative knees.

Strengths of the study

This study includes patients spanned over a large period (15 years) operated by a single surgeon. Patients are distributed along all age groups ranging from 35 to 77 years of age. A range of associated factors such as B.M.I, diabetes, age, gender, and mechanical symptoms have been studied.

Limitations of the study

A small sample size, the inclusion of a retrospective cohort, and recall bias in the retrospective cohort are possible limitations of the study.

Conclusion

We recommend arthroscopic surgery in patients with degenerative knees with mechanical symptoms and acute exacerbation of symptoms, not amenable to conservative measures.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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- and osteoarthritis outcome score physical function short form (KOOS-PS), Knee Outcome Survey Activities of Daily Living Scale (KOS-ADL), Lysholm Knee Scoring Scale, Oxford Knee Score (OKS), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), Activity Rating Scale (ARS), and Tegner Activity Score (TAS). *Arthritis Care Res (Hoboken)* 2011;63 Suppl 11:S208-28.
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