

Role of Arthroscopy in the Treatment of Osteoarthritis of Knee

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ABSTRACT

Background: A variety of procedures have been described for treatment of the osteoarthritic knee. Comprehensive Arthroscopic treatment regime has definite role in treating patients with knee Osteoarthritis.

Aim: To evaluate the role of arthroscopy in functional and subjective outcomes of patient with moderate to severe osteoarthritis of knee.

Materials and Methods: Between October 2011 to September 2013, 30 patients were treated with an arthroscopic regimen. Patients with primary osteoarthritis who fulfilled clinical and radiographic classification criteria of American College of Rheumatology for osteoarthritis were included. All patients were followed for 18 months. All patients were subjected to comprehensive arthroscopic treatment.

Results: Overall, mean age was 59 years, with 17 females and 13 males. According to Kellgren Lawrence scale, 17 patients had grade 2 osteoarthritis, 10 had grade 3 osteoarthritis and 3 patients had grade 4. The average preoperative Lysholm score was 38.8. According to Outerbridge grading of chondral surface lesions, 14 patients were in grade-1, 5 in grade-2, 8 in grade-3 and 3 patients were in grade-4. The average 18 months postoperative Lysholm score was 83.3 (range 60- 96). 73.33% patients showed good/excellent outcome. 80% of patients with chondral and meniscal lesions showed excellent/good outcome.

Conclusion: This arthroscopic treatment regimen can improve function and activity levels in patients with moderate to severe osteoarthritis. Patients with meniscal and chondral pathology will be benefited more by arthroscopic treatment.

Keywords: Lysholm score, Meniscal lesion, Outerbridge grading

INTRODUCTION

In osteoarthritis all structures of joint undergoes pathological change leading to joint failure [1]. Osteoarthritis is most frequent joint disease and its prevalence in India is 22% to 39% [2-4]. In elderly osteoarthritis is the most common cause of locomotor disability [4]. Numerous treatment modalities are available for knee osteoarthritis. Treatment modalities include high tibial osteotomy, distal femoral osteotomy, arthrodesis, arthroscopic debridement, osteochondral or chondrocyte transplantation and arthroplasty. While choosing treatment modality patient's age, activity level, severity of disease, number of knee compartment involved and patient's expectations are taken into consideration [5].

Recently, the usefulness of arthroscopy for the degenerative knee has been challenged. In patients with advanced osteoarthritis of knee, total knee replacement provides predictable outcome but patient's who wish to maintain higher level of activity tend to avoid total knee replacement. Total knee replacement is associated with increased risk of morbidity and limited life time of joint replacement thus total knee replacement is not the solution for all patients. Arthroscopic techniques result in less postoperative pain and shorter rehabilitation than open procedures [6].

Arthroscopic technique like lavage, debridement and abrasion arthroplasty has been used in many studies evaluating role of arthroscopy in knee osteoarthritis. Probable explanation for relief of patient's symptoms after arthroscopic lavage is that it removes cartilaginous debris and inflammatory factors. There is large number of studies suggesting beneficial effect of arthroscopic debridement in knee osteoarthritis. After arthroscopic debridement success rate is about 70% and when compared to lavage beneficial effect of debridement lasts longer. In active older adults with mild to moderate osteoarthritis of knee in whom conservative methods have failed arthroscopic debridement provides good option for a better outcome [5].

Purpose of present study was to evaluate the beneficial effects of knee arthroscopy in osteoarthritis and also to find out whether arthroscopic treatment can delay the need of total knee arthroplasty.

MATERIALS AND METHODS

The present study was conducted at tertiary care centre over a period of two years from October 2011 to September 2013. This was a quasi experimental study in which thirty cases were studied depending on the inclusion and exclusion criteria.

Inclusion Criteria

- Patients with primary osteoarthritis.
- Patients who fulfill clinical and radiographic criteria of American college of rheumatology for osteoarthritis.
- Patients who failed to improve with conservative treatment.

Exclusion Criteria

- Patients with secondary osteoarthritis.
- Uncertain diagnosis.

Ethical approval was taken from Institution Ethical Committee. Informed consent was taken from all participants. The arthroscopic procedure was done under spinal anaesthesia or general anaesthesia.

Plain X-ray of knee joint in two orthogonal view (AP weight bearing & Lateral at 30 degrees flexion) was done in all patients. Grading of knee osteoarthritis was done using the Kellgren Lawrence Scale [Table/Fig-1] [7].

Patients were positioned in supine position with hip flexed, abducted and externally rotated and knee flexed to 90 degrees. Tourniquet was applied routinely during the operative procedure. Antero-lateral and antero-medial portals were used. Routine diagnostic arthroscopy was then carried out. The facets of patella, trochlea and meniscus were visualized. While performing diagnostic arthroscopy we also

graded the chondral surface lesions using Outerbridge grading system [8]. Outerbridge grading system for chondral surface lesions is illustrated in [Table/Fig-2]. Joint insufflation and lavage was done in all patient's. During diagnostic arthroscopy if adhesions were identified then lysis of adhesions were performed particularly within supra patellar pouch so as to improve joint volume. All loose bodies and osteophytes were identified and removed. In patient's with meniscal tear where it was possible to salvage the meniscus we performed partial meniscectomy. Whereas patients with complete meniscal tear were treated with total meniscectomy. Partial synovectomy was done only if synovium was very much inflamed and hypertrophied. All loose chondral flaps were removed and contouring of cartilage defect was done.

Description	Grading
Normal	0
Doubtful narrowing of joint space and possible osteophytic lipping.	1
Definite osteophytes and possible narrowing of joint space.	2
Moderate multiple osteophytes, definite joint-space narrowing, some sclerosis and possible deformity of bony ends.	3
Large osteophytes, marked joint-space narrowing, severe sclerosis and definite deformity of bony ends.	4

[Table/Fig-1]: The Kellgren Lawrence Scale

Grades	Description
Grade I	Softening and swelling of cartilage
Grade II	Fragmentation and fissuring, less than 0.5-inch-diameter lesion.
Grade III	Fragmentation and fissuring, greater than 0.5-inch-diameter lesion.
Grade IV	Erosion of cartilage down to exposed subchondral bone.

[Table/Fig-2]: Outerbridge grading of chondral surface lesions

Postoperative Care

While preserving joint mobility primary goals were to maintain joint volume and prevent scar reformation. Whereas regaining strength was secondary to these goals [9]. Throughout the rehabilitation program, exercises that elicit pain were avoided. In general, patients recovering from this treatment package shall progress through a 3-phase rehabilitation protocol [10].

1) Early postoperative phase (0-6 weeks)

Joint mobility: Passive and active assisted range of motion was started. Full knee extension was obtained in one week and full knee flexion in three weeks.

Muscle performance: Isometric exercise training was started.

Weight Bearing: Initially weight bearing was allowed with crutches. Once full extension, 100 degrees of flexion and no extensor lag status was achieved full weight bearing was allowed. As soon as patient meets full weight bearing status low impact aerobic activities were initiated at 3-6 weeks.

2) Intermediate phase (6-12 weeks)

Joint Mobility: Full motion was achieved. Open and closed chain resistance exercises were started.

Weight bearing and functional training: Initially agility and sport specific skill training were initiated at 50% effort and then gradually progressed to full efforts as tolerated.

3) Return to activity phase (12 weeks beyond): Patient's returned to full activity by this period [10].

Assessment of Results

Patients follow up done at 1 week, 2 weeks, 3weeks, 4weeks, 6weeks, 8weeks, 10 weeks, 12weeks, 4 month, 6 month, 9 month, 12 month, 15 month, 18 months.

Patient satisfaction was graded on ordinal scale as

1. Not satisfied.
2. Fairly satisfied.
3. Satisfied.
4. Very satisfied.

The Lysholm score [11] was calculated preoperatively and postoperatively at 6 months, 12 months, and 18 months. Grading of Lysholm score [12]:

<65 = Poor.

65-83 = Fair.

84-90 = Good.

>90 = Excellent.

RESULTS

Between October 2011 to September 2013, 30 patients (17 females and 13 males) who meet the inclusion criteria of study were included and followed. The mean age for all patients was 59.26 years with the range of 44 to 69 years. Mean age for female was 57.58 years with range of 44 to 67 years. Mean age for male was 61.46 years with the range 46 to 69 years. The mean duration of symptoms was 13.2 months in the range of 6 to 24 months. Patients presented with multiple complaints. The most common complaint was pain in knee and it was present in all 30 (100%) patients. Second most common complaint was impaired squatting and it was present in 25 (83.33%) patients. Other complaints were swelling of joint, catching sensation in knee, locking of joint, limp, and crepitation in joint. Most of the patients had more than one clinical finding on examination of knee joint which are shown in [Table/Fig-3]. Patients were classified according to the Kellgren Lawrence Scale into four grades as illustrated in [Table/Fig-4]. There were 17 patients in grade-2, 10 patients in grade-3 and 3 patients in grade-4 according to the Kellgren Lawrence Scale.

On arthroscopy all patients were divided into four grades based on Outerbridge grading of chondral surface lesions. There were fourteen (46.66%) patients in grade-1, five (16.66%) patients in grade-2, eight (26.66%) patients in grade-3 and three (10%) patients in grade-4. Eleven (36.66%) patients were having meniscal lesion. Out of eleven 5 patients were having complete tear of meniscus where as remaining 6 were having incomplete tear of meniscus. Complete meniscectomy was performed in 7 patients and 4 patients underwent partial meniscectomy and balancing of meniscus. Sixteen (53.33%) patients in Outerbridge grade-2, grade-3 and grade-4 underwent debridement of chondral lesions and contouring of cartilage defect. Partial synovectomy was performed in 9 (30%) patients. All patients were treated by lavage of joint and joint insufflations [Table/Fig-5]. Preoperative Lysholm scoring was done for all patients. Preoperative Lysholm scoring mean was 38.56 and range was 24-55 [Table/Fig-6]. For female patients preoperative Lysholm scoring mean was 39.88 and range was 24-55. For male patients preoperative Lysholm scoring mean was 36.84 and range was 24-51. Postoperative Lysholm scoring was done at 6 months, 12 months and 18 months. At 6 months postoperative Lysholm scoring mean was 88.76. At 12 months postoperative Lysholm scoring mean was 86.83 and at 18 months postoperative Lysholm scoring mean was 82.36. For female patients 18 months postoperative Lysholm scoring mean was 84.35. For male patients 18 months postoperative Lysholm scoring mean was 79.76. [Table/Fig-7] demonstrates outcome of patient's 18 months postoperatively as per grading of Lysholm score grading. At 18 months post-operative 86.66% (26 patients) were satisfied with treatment outcome. One patient developed superficial infection at anteromedial portal which was treated with antibiotics. Statistical analysis was done using paired-t-test and improvement in Lysholm score was determined. When preoperative Lysholm score was compared statistically using paired t-test with Lysholm score at 6, 12 and 18 month postoperatively [Table/Fig-8-10], values was statistically significant suggesting beneficial effect of arthroscopic treatment regimen.

Examination Findings	Number of Patient's	Percentage
Effusion in joint	20	66.66%
Local rise of temperature	13	43.33%
Joint line tenderness	12	40%
Limitation of range of movements	11	36.66%
Positive Mc-Murrays test	10	33.33%

[Table/Fig-3]: Table showing examination findings in patients

Kellgren Lawrence Scale Grade	Percentage of Patient's
Grade 1	0
Grade 2	56.67%
Grade 3	33.33%
Grade 4	10%

[Table/Fig-4]: Table showing percentage of patients according to Kellgren Lawrence scale

Operative procedure		No. of patients
Meniscectomy	Partial	4
	Complete	7
Debridement and contouring of cartilage defect		16
Partial Synovectomy		9
Lavage		30
Joint insufflations		30

[Table/Fig-5]: Table representing operative procedures performed

Sex	Preoperative Lysholm scoring	
	Mean	Range
Female	39.88	24-55
Male	36.84	24-51

[Table/Fig-6]: Preoperative Lysholm scoring

18 months postoperative Lysholm score grading	Number of patients	Percentage
Excellent	10	33.33
Good	12	40
Fair	2	6.66
Poor	6	20

[Table/Fig-7]: Table representing 18 months postoperative outcome

DISCUSSION

In patients with moderate to severe knee osteoarthritis, after arthroscopic treatment, we started rehabilitation program which was aimed at maintaining joint mobility and volume. We observed improvement in functional status of those patients.

We selected patients carefully, only those patients who failed to improve after conservative treatment and those patients who reported difficulty in carrying out day to day activities were included in study. Our surgical approach put emphases on preserving meniscus and articular cartilage as far as possible. However, any meniscal tear which were beyond repair capability were treated by partial or complete meniscectomy. Similarly, chondral flaps which were unstable and/or were causing limitation of joint movements were removed.

Although lavage was performed in all patients the primary goal was not just to clear debris but to increase joint volume and to mobilize joint. The principle goals of rehabilitation program were the maintenance of joint volume and prevention of scar reformation while preserving joint mobility. Similar treatment regime was used by Steadman JR et al., [6] while evaluating functional and subjective outcomes after comprehensive arthroscopic treatment in patients with moderate to severe osteoarthritis of knee.

With above mentioned technique comprehensive arthroscopic treatment was given to 30 patients with moderate to severe OA. All patients were followed for 18 months. Seventeen females and thirteen males were included and the mean age in study group was 59.2 years (range 44-69).

Significant improvements in the Lysholm score were found in our study, with an average improvement of 43.88 points. This improvement is higher as compare to results of Steadman JR et al., [6] who reported average improvement of 25 points. In our study 11 (36.66%) patients had meniscal lesions. Complete meniscectomy was performed in 7 patients and remaining 4 were treated by partial meniscectomy, 81.81% of these patients showed excellent/good results following treatment. We found positive correlation with presence of meniscal lesions and clinical outcome after arthroscopic treatment, which is consistent with the findings of other studies [13-16]. Our finding of 81.81% excellent/good results in patients with meniscal lesions, closely matched with finding of Midori O et al., who reported 79% patient satisfaction after arthroscopic partial meniscectomy of torn posterior horn of medial meniscus for osteoarthritis of medial knee compartment [17].

	Paired difference					T	df	Sig. (2-tailed)
	Mean	SD	Std. Error Mean	95% Confidence interval of the difference				
				Lower	Upper			
Lysholm preoperative- Lysholm 6 months postoperative	-50.20	10.52	1.92	-54.12	-46.27	-26.13	29	<0.05

[Table/Fig-8]: Comparison of preoperative lysholm score and 6 months postoperative lysholm score using paired T test

	Paired difference					T	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence interval of the difference				
				Lower	Upper			
Lysholm preoperative - Lysholm 12 months postoperative.	-48.26	10.92	1.99	-52.34	-44.18	-24.19	29	<0.05

[Table/Fig-9]: Comparison of preoperative lysholm score and 12 months postoperative lysholm score using paired T test

	Paired difference					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence interval of the difference				
				Lower	Upper			
Lysholm preoperative - Lysholm 18 months postoperative.	-43.80	15.31	2.79	-49.51	-38.08	-15.66	29	<0.05

[Table/Fig-10]: Comparison of preoperative lysholm score and 18 months postoperative lysholm score using paired T test

Patients with loose chondral flaps treated either by debridement or contouring of cartilage defects showed excellent to good results in 75% cases. Figueroa D et al., [16] in their study showed 84.61% excellent to good results in cases with unstable chondral lesions. In our study severe Outerbridge grade 4 chondral lesions was associated with poor outcome and this is consistent with finding of Steadman JR et al., [6]. Overall 73.33% of patients showed excellent to good outcome and 86.66% were satisfied with treatment these findings are consistent with findings of other study [6,16,17]. Our arthroscopic treatment regimen was associated with very low complication rate, similar opinion was also held by Wai E and Williams J in their study [18].

CONCLUSION

Knee osteoarthritis is a common cause of locomotor disability in the elderly. Arthroscopic treatment of knee osteoarthritis is safe, simple and associated with minimal complication and patient's can be discharged from hospital within 2 days of admission. Patients with meniscal and chondral pathology are benefited more by this treatment regimen compare to patient's without meniscal and chondral pathology. This arthroscopic and rehabilitation regimen improved function of the arthritic knee. Comprehensive Arthroscopic treatment regime has definite role in treating patients with knee osteoarthritis.

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