

## Research Article

# Role of arthroscopy in osteoarthritis of the knee joint

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### ABSTRACT

**Background:** Degenerative changes in the knee occur with increasing frequency after the third decade of life. In early osteoarthritis with no mal-alignment of the knee, arthroscopic surgery is an attractive alternative for many elderly patients as it reduces the degree of surgical insult and postoperative rehabilitation with hope of restoration of painless mobility. To study the role of arthroscopic debridement in alleviation of pain in cases of osteoarthritis knee and to evaluate the effectiveness of arthroscopy in diagnosis of osteoarthritis knee and its co-relation with radiological diagnosis.

**Methods:** The present study is cross-sectional study of consecutive cohort of 53 patients. Body mass index was calculated based on height and weight of the patients and from their assessment of X - Rays patients were graded from 0 to 4 based on Kellegren–Lawrence radiological grading method. Selected patient were then assessed by pain domain of the knee society scoring system, which is joint specific score ranging from 0 to 50. These patients were then subjected to arthroscopic examination and debridement.

**Results:** Overall 17 (32.08%) out of total 53 cases studied showed improvement after one year. Majority of patients improved were grade 2 (57.89%) but none of the grade 4 patients showed improvement at 1 year.

**Conclusions:** Arthroscopic debridement does not influence the ongoing pathological process; it is only useful for symptomatic relief in cases of low grade osteoarthritis where it provides pain relief. Conversely, in patient with sever osteoarthritis there is very limited role of arthroscopy.

**Keywords:** Arthroscopy, Osteoarthritis of the knee joint

### INTRODUCTION

Arthroscopy was first used in examining the knee joint in 1981 by Prof. Takagi and others. Since then arthroscopy has become widely accepted for pathologic study of the knee and by 1974, Richard O' Connors initiated arthroscopic surgery which brought many benefits for the patient. Degenerative changes in the knee occur with increasing frequency after the third decade of life. Various changes alone or in combination contribute to the pain, swelling and functional disturbances of the knee joint. For many years it was assumed that a damaged degenerative joint was beyond repair and treatment was essentially symptomatic. In extreme cases, radical

surgery like arthrodesis was offered with resultant loss of movement which was considered inevitable. In approaching these problems, many operative procedures have been done in past, and reported in literature. In recent year's arthroscopic surgery, osteotomy and implant arthroplasty have been offered to the patient in different stages of the disease. In early osteoarthritis with no mal-alignment of the knee, arthroscopic surgery is an attractive alternative for many elderly patients as it reduces the degree of surgical insult and postoperative rehabilitation with hope of restoration of painless mobility. The concept of debridement of the knee joint for arthritic condition was first introduced by Magnuson.<sup>1</sup> this procedure came to be known as "House cleaning". He pointed out that removal of all mechanically irritating

products of joint degeneration renders the patient symptoms free. The procedure was performed through an extensive arthrotomy which included meniscectomy, synovectomy, osteophytes resection and decortication of bone including multiple drill holes.<sup>2</sup> Jackson R. W. suggested that the irrigation of osteoarthritic joints during arthroscopy is of benefit in the management of the arthritic knee. This became popularly known as Lavage.<sup>3</sup>

#### **Aims and objective**

1. To study the role of arthroscopic debridement in alleviation of pain in cases of osteoarthritis knee.
2. To evaluate the effectiveness of arthroscopy in diagnosis of osteoarthritis knee and its correlation with radiological diagnosis.

#### **METHODS**

The present study is cross-sectional study of consecutive cohort of 53 patients. In the present study a cases coming in outpatient department of orthopaedics with complain of knee pain were considered for their eligibility in the present study. Patients were then observed based on their age, sex, height, weight, drug history, detailed clinical examination and x - rays, of both knee antero - posterior view in standing position and lateral view in supine position. Body mass index was calculated based on height and weight of the patients and from their assessment of x - rays patients were graded from 0 - 4 based on kellegren-lawrence radiological grading method. Each radiograph was measured by two observers so that we could nullify the interobserver error. Patients were then selected based on following inclusion and exclusion criteria.

#### **Inclusion criteria**

1. Age - 18 -70 years.
2. Patients who meet the American college of rheumatology criteria for osteoarthritis of the tibiofemoral joint.
3. No response to oral anti-inflammatory medications.
4. An osteoarthritis of grade 2 or higher according to the kellegren – lawrence method.<sup>4</sup>
5. Normal or overweight by body mass index.
6. Ability to communicate regarding outcome of the procedure.

#### **Exclusion criteria**

1. Osteoarthritis with predominant involvement of patelo - femoral joint.
2. Secondary osteoarthritis.

Patients having ipsilateral hip pain or radicular pain. Selected patient were then assessed by pain domain of the knee society scoring system, which is joint specific score ranging from 0 to 50.<sup>5</sup>

**Table 1: Kellgren and Lawrence radiological grading.<sup>4</sup>**

Grade	Features
0	No features of osteoarthritis.
1	Doubtful; minute osteophytes of doubtful significance.
2	Minimal; definite osteophytes but joint space unimpaired.
3	Moderate; moderate diminution of joint space.
4	Sever; joint space severely impaired with sclerosis of subchondral bone.

**Table 2: Pain domain of Knee society score.**

Walking (Pain while walking)

Category	Value
None	35
Mild or Occasional	30
Moderate	15
Severe	0

Stairs (Pain while climbing steps of stairs)

Category	Value
None	15
Mild or Occasional	10
Moderate	5
Severe	0

All patients were asked standard questions to facilitate scoring and group assignment. Mild pain was defined as pain experienced only when the patient walked, and it was usually occasional. Moderate pain, graded as either occasional or continuous, and was defined as being associated with limitations in functional activity and occasional use of analgesics. Severe pain was present at night or at rest and required the frequent use of analgesics.

Then total score is counted and score is given as out of 50, 50 suggest no pain and 0 suggest sever pain.

#### **Method of arthroscopic examination and debridement:**

After patients were considered for arthroscopy, and passing from pre-anesthetic checkup, patient was taken in Operation Theater, and after giving an appropriate anesthesia, patient was taken on operation table in supine position with both legs hanging down the operation table. A padded lateral post was used for stressing the knee to open up various compartments, necessary for diagnostic and operative procedure. The use of a padded lateral post attached to the edge of the operating table can be effective for valgus stressing in or near full extension, but it does not control rotation. A tourniquet was placed around the thigh, but was not inflated unless troublesome

bleeding occurs. Inflation of the tourniquet blanches the synovium and other vascularized tissue and makes diagnostic evaluation of these structures more difficult. Meniscal vascularity and healing potential were evaluated with the tourniquet deflated and the intraarticular hydrostatic pressure low. The tourniquet usually was inflated after exsanguinations of the limb. Tourniquet time was minimized and not exceeds 90 minutes for routine procedures to prevent possible deep vein thrombosis. Painting and draping of limb done under all aseptic precaution. All standard and optional portals were marked. Typically, the outlines of the patella and patellar tendon were drawn, medial and lateral joint lines were palpated with the fingertip and drawn, and the posterior contours of the medial and lateral femoral condyles were marked. But most of the time anterolateral and anteromedial portal was used. Anterolateral portal is located approximately 1 cm above the lateral joint line and approximately 1 cm lateral to the margin of the patellar tendon. Palpation of the inferior pole of the patella helps to ensure that the anterior portals are not placed too high; the portal should be approximately 1 cm inferior to the patella. Anteromedial portal is located similarly to the anterolateral portal: 1 cm above the medial joint line, 1 cm inferior to the tip of the patella, and 1 cm medial to the edge of the patellar tendon. Then scope canula with trochar was inserted in to the joint through the anterolateral portal and joint was distended with normal saline through. After sufficient distention of joint, trochar was removed and scope with TV camera was inserted in to the joint. Then knee was examined in the following order of compartments.

1. Suprapatellar pouch and patellofemoral joint
2. Medial gutter
3. Medial compartment
4. Intercondylar notch
5. Posteromedial compartment
6. Lateral compartment
7. Lateral gutter and posterolateral compartment

In present study, debridement included thorough normal saline wash, removal of loose bodies, removal of loose flaps of articular cartilages and removal of frayed meniscal margins and articular cartilages. Intra operative grading of articular cartilage degeneration was done by method described by Noyes - Stabler.<sup>6</sup>

#### **Post- operative protocol**

Patient allowed walking fully weight bare from next day only. And discharged on day two of post - op after dressing. Jone's dressing was removed in third post-operative day. Patient called for suture remove in OPD on 11th post-operative day and suture was removed. Patients were advised knee quadriceps and hamstring exercises. Patient called for follow - up on 6 weeks, 3 months, 6 months, and 1 year of post-operative day in OPD, and pain severity score was measured according to knee

society pain score<sup>5</sup> routine physical examination of knee was done for other physical signs.

**Table 3: Noyes – Stabler articular cartilage degeneration grading.<sup>6</sup>**

Grade of Articular Cartilage	Defect Description
0	Normal articular cartilage
IA	Mild softening or discoloration of articular cartilage
IB	Severe softening or discoloration of articular cartilage
IIA	Partial-thickness defect of < 50% of the total thickness of articular cartilage
IIB	Partial-thickness defect of > 50% of the total thickness of articular cartilage
IIIA	Full-thickness articular cartilage defect with normal subchondral bone
IIIB	Full-thickness articular cartilage defect with erosion of subchondral bone

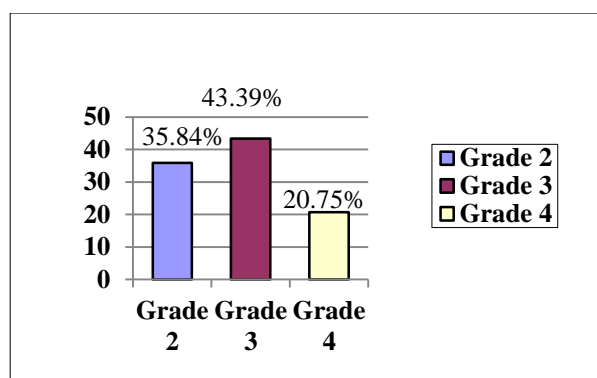
#### **Statistical method**

For the comparison of knee pain and Body mass index correlation coefficient (r) was calculated between pain severity score and body mass index. For comparison of radiological grading Kellengren-Lawrence<sup>4</sup> and arthroscopic grading Noyes - Stabler<sup>6</sup> we gave a score to all grading of Noyes-stabler from 0-6 according to severity e.g. for IA grade score of 1, for IB grade score of 2 likewise up to IIIB grade score of 6 was allotted. And after that total of score of medial joint line and highest grade for that joint is counted e.g. medial joint grade IIB score 4, lateral joint grade IB score 2, and patellofemoral joint grade IA score 1, so for this joint total score was 7 and highest score is 4. After that all patients grouped in 3 groups according to their radiological grade and their total and highest arthroscopic score were compared to that of radiological grade by correlation coefficient(r) method and final and from value of that r we reached to final conclusion.

#### **RESULTS**

In present study, total 53 cases of osteoarthritis of knee were studied. Age varied from 36 years to 70 years and mean age of patient was 55 years. Male were 23 (43.36%) and Female were 30 (56.60%). Body mass index wise distribution of 53 cases showed 51% cases to be normal and 49% cases to be overweight.

**Kellegren-Lawrence radiological grading wise distribution of 53 cases.**



**Figure 1: Radiological grading wise distribution.**

Grade 3 was maximum 43.39%, followed by grade 35.84%, and grade 4 20.75%.

**Post operative follow up of 53 patients.**

**Table 4: Pain severity score deterioration.**

Grade	6 weeks	3 months	6 months	1 year
2	0%	10.52%	21.05%	10.01%
3	0%	26.08%	82.60%	69.56%
4	0%	36.36%	100%	100%

(In above table PSS was compared with previous follow up score).

**Table 5: Percentage of patients improved compared to pre - operative PSS.**

Grade	Improvement
2	57.89%
3	26.08%
4	0%

**Mean and SD chart of total and highest score of Noyes - stabler grade.**

**Table 6: Kellgren-Lawrence Scale<sup>4</sup>: Association between severity of articular cartilage degeneration within knee joint and radiographic grade of osteoarthritis.**

Radiographic grade	No. of patients	Highest grade of articular cartilage degeneration		Total grade of articular cartilage degeneration	
		Mean	SD	Mean	SD
0	-	-	-	-	-
1	-	-	-	-	-
2	19	1.6	0.67	2.6	1.49
3	23	3.0	1.19	6.3	2.55
4	11	5.6	0.92	12.2	1.65
Total	53				

By using mean and standard deviation from above data, coefficient of correlation (r) between highest grade of articular cartilage and radiographic grade was calculated to be 0.9. Between total grade of articular cartilage degeneration and radiographic grade it was 1.0. Both of these suggest strong correlation.

**DISCUSSION**

The role of arthroscopy in treating osteoarthritis of the knee has always been debating. The present study was directed at, to study the role of arthroscopic debridement in alleviation of pain in cases of osteoarthritis knee and to evaluate the effectiveness of arthroscopy in diagnosis of osteoarthritis knee and its co-relation with radiological diagnosis. The maximum number of patients belongs to 50 - 60 years and varied from 36 - 70 years. This finding is in conformation with the studies done by Eugene et al. Older age group was most affected because of osteoarthritis is degenerative condition which commonly occurs in older group. Males were 23 (43.36%) and females were 30 (56.60%) this finding is comparable with the studies done by Richard et al.<sup>2</sup>

**Table 7: Comparison of Kellegren-Lawrence radiological grading<sup>4</sup> wise distribution of 53 cases.**

Grade	In Present	Roy et al. <sup>7</sup>
2	35.84%	53%
3	43.39%	29%
4	20.75%	18%

In present study grade -3 constituted maximum (43.39%) which is not comparable with study of Roy et al.<sup>7</sup> where grade-2 was observed to be maximum (53%). But this difference may be accidental finding. Mean pain severity score in over weight patient was 19.61 and in normal weight patients was 41.29, is showing more pain in over weight patients then normal weight patients. Correlation coefficient (r) between body mass index and pain severity score was calculated and was found -0.70, is suggestive of strong negative correlation between this two parameters, means as body mass increases pain severity score decreases (pain increases) and vice versa.

Overall 17 (32.08%) out of total 53 cases studied showed improvement after one year. Majority of patients improved were grade 2 (57.89%) but none of the grade 4 patients showed improvement at 1 year. This is because less severe grade 2 patients have mild degenerative changes and less inflammatory reaction, whereas more severe grade 4 patients have irreversible degenerative changes and distorted mechanical axis, hence do not show improvement at all. Even though grade 2 patients showed improvement in pain severity score after duration of 1 year with respective to their preoperative scores, but there was constant deterioration in the post- operative PSS at 6 weeks, 3 months, 6 months and 1 year and this rate of deterioration was even more with grade 3 and fastest in grade 4. Grade 4 patients showed no



improvement, rather experienced continuous deterioration highlighting no effect of arthroscopic debridement on the ongoing pathological process. However, these changes observed in pain severity score might have been influenced by several other factors like age, weight, life style patterns of the patients.

**Table 8: Relation between radiographic grading of osteoarthritis and degree of articular cartilage degeneration within knee joint identified at arthroscopy.**

Study	Radiographic grading	Correlation coefficient of highest grade of articular cartilage degeneration	Correlation coefficient of total grade of articular cartilage degeneration
Richard et al <sup>2</sup>	Kellgren – Lawrence	0.49	0.49
Present study	Kellgren – Lawrence	0.9	1.0

## CONCLUSION

To conclude, present study shows continuous deterioration in post-operative pain severity score in various grades of osteoarthritis. Since arthroscopic debridement does not influence the ongoing pathological process, it is only useful for symptomatic relief which is of limited duration. It appears that the arthroscopic debridement is useful in cases of low grade osteoarthritis (Kellgren-Lawrence grade 2) where it provides pain relief. Though these patients deteriorate but still their pains is still less severe than pre-operative pain and the end of one year post operatively. Conversely, in patient with severe osteoarthritis (Kellgren Lawrence grade 4) there is very limited role of arthroscopy and should not be routinely advised for such patients, but it could be recommended for specific treatment goals for example, alleviation of mechanical locking. Still unresolved by this study is the role of arthroscopy for patients with moderate osteoarthritis (Kellgren Lawrence grade 3). Present study also shows that to perform arthroscopic debridement just for diagnostic purpose is of limited use in cases with severe osteoarthritis, as that can be achieved non-invasively by radiographic means. Though for mild osteoarthritis arthroscopic grading of articular cartilage degeneration is better tool of diagnosis, as arthroscopic grading gives better idea of articular degeneration and arthroscopic grading is strong predictor of outcome of arthroscopic debridement, so it is very useful to counsel patients post operatively for expectation of benefit after arthroscopic debridement. Use of arthroscopic debridement in present scenario is debatable, and needs to be checked. Arthroscopic debridement should not be routinely advised in all patients of osteoarthritis knee, patient selection appears to be important for this procedure should be based on various factors like severity of osteoarthritis, mechanical symptoms and signs, cost

effectiveness, availability of radiographic means, age, weight, and life style patterns of the patients. It is useful to counsel the patient about effectiveness, advantages and disadvantages of arthroscopic debridement before subjecting them to this invasive procedure.

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