Proceedings S.Z.P.G.M.I vol. 14(2) 2000, pp. 57-61.

Evaluation of Meniscal and Ligamentous Injuries of the Knee with Arthrography and Arthroscopy

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SUMMARY

With modern high speed vehicular trauma and increasing participation in sports, traumatic lesions of the knee have become quite common. Various diagnostic modalities are available to confirm the diagnosis after clinical evaluation. Fifty cases of chronic knee injury in which Lachman, Anterior Drawer or McMurray's test were positive, were evaluated with Double Contrast Arthrography followed by Arthroscopy after two days. Study was carried out at Orthopaedic Department of Shaikh Zayed Hospital in collaboration with Radiology Department. Forty nine were male and one female. Age range was 14-50 years (mean 25.5 years). Duration of symptoms were 3-5 years (mean 4 years). Right knee was found to be more frequently involved (27 right knee and 23 left knee). Twenty five cases had sports injury, twenty two cases had road traffic accident and three cases had domestic injury. Twenty cases of medial meniscus injuries were identified by Arthrography while twenty five cases by Arthroscopy. Thirteen cases of lateral meniscal injury were picked by Arthrography while twenty one cases were confirmed by Arthroscopy. Arthroscopy diagnosed 34 cases of anterior cruciate ligament while Arthrography picked up only 2 cases. Diagnosis of posterior cruciate ligament injury was poor, only 2 cases by Arthroscopy and nil by Arthrography. It is concluded that Arthrography is complementary to Arthroscopy in diagnosing meniscal and ligamentous injuries of the knee and accuracy can be improved with experience.

INTRODUCTION

Knee joint is the largest and most complex joint in the body and is the most commonly injured joint.

Knee problems are diagnosed by history and physical examination using functional tests and are confirmed by x-rays, arthrography, CT, MRI and arthroscopy.

Arthrography is an accurate method for demonstrating the internal anatomy of the knee. Its accuracy is 90%.[1] Double contrast arthrography is useful in meniscal injuries. It is an out-patient procedure and requires no anaesthesia. It is easy to perform and reliable with minimal radiation exposure to the patient.[2]

Arthroscopy is usually performed in operating room mostly under general anaesthesia. It gives useful information and accurate diagnosis in meniscal and ligamentous injuries of the knee. Its accuracy is 95%.[3] It has the advantage of being a diagnostic and therapeutic procedure.

High resolution computed tomography found to have 91% accuracy in meniscal tears but it is expensive and accuracy depends upon experience and interperative skills.[4]

MRI is a more attractive modality being a non-invasive and its accuracy is over 90% in diagnosing both cruciate and meniscal injuries.5 But in our country it is an expensive procedure and is not affordable for most of the patients.

Most of procedures for diagnosis, like CT, MRI are expensive and there is no study comparing results of arthrography and arthroscopy available in this country.

AIMS AND OBJECTIVES

i. To evaluate the diagnostic accuracy of arthrography and arthroscopy in meniscal and ligamentous injuries of the knee in our setting.
ii. To study the complications of both procedures.

PATIENTS AND METHODS

Fifty patients between the ages of 14-50 years (mean age 25.5 years) and male to female ratio 49:1 with post traumatic knee pain of at least 3 months duration with history of locking and/or giving way without evidence of fracture were included in the study. Mechanism of injury was rotational in 72% and medial to lateral stress in 24%. Patients in whom at least one of the following tests were positive were included in the study.

McMurray's test
Drawer test
Lachman test

Arthrography was carried out as an out-patient procedure under fluoroscopy in Radiology Department. Double contrast was used. A mixture of four to five ml of renografin 60% (Meglumine sodium diatrizoate) and fifty to seventy ml of dry air was injected into the affected knee under aseptic conditions and active extension and flexion exercises were performed for five minutes.

Various views were taken while patient was in prone position. While knee was in posterior oblique position valgus stress given and view taken for posterior horn of medial meniscus, knee rotated 45° internally to bring it poster-anterior projection for mid-portion of medial meniscal. Knee rotated further 45° internally and valgus stress given, view taken for anterior horn of medial meniscus. Same views were taken for lateral meniscal injury after giving varus stress. For anterior cruciate ligament knee was flexed 60°, proximal tibia pushed anteriorly to make it taut and lateral view was taken.[6]

Arthroscopy was performed in the operating room under strict sterile conditions under general anaesthesia and tourniquet control. Rigid knee arthroscope with 30° wide angle forward oblique telescope with outer diameter of 4mm fitted with fibreoptic illumination was used. The joint was distended using normal saline. The portal of entry was anterolateral. The probe was entered anteromedial. The knee was examined in the following sequence. Suprapatellar pouch and patellofemoral joint. Medial compartment, intercondylar notch, lateral compartment, lateral gutter and popliteus hiatus for any loose bodies. At the end of the procedure the joint was washed and was infiltrated with Bupivacaine solution. Compression bandage was applied and patient was discharged the next day.

RESULTS

Male to female ratio was 49:1. Seventy percent were between the age of 21-30 years (Table 1).

Table 1: Sex Distribution (n=50).

Parameters	*Number*	*Percent*
Sex		
Male	49	98
Female	1	2
Age distribution (Years)		
14-20	6	12
21-30	35	70
31-40	9	18
41-50	0	0
Knee Involved		
Right	27	54
Left	23	46
Mode of Injury		
Mode of injury		
Road traffic accident	22	44
Sports injury	25	50
Domestic	3	6
Mechanism of injury		
Medial or lateral stress	12	24
Rotational	36	72
Ant. or Post. thrust	2	4

Right knee was involved in 27 cases and left knee was involved in 23 cases. Forty four percent were road traffic accident and fifty percent were of sports injury. Seventy two percent rotational injury, twenty four percent medial or lateral stress and four

percent anterior or posterior thrust. Anterior Drawer was positive in sixty two percent of cases while Lachman test was positive in fifty six percent of cases. McMurray test was positive in fifty six percent in medial meniscal injury and twenty percent in lateral meniscal injury. Anterior Drawer test was more valuable than Lachman test in out study. McMurray and Appley Grinding test revealed good coordination with meniscal tears.

Arthrography picked 20 cases of medial meniscal injury and 13 cases of lateral meniscal injury, while arthroscopy diagnosed 25 cases of medial meniscal injury and 21 cases of lateral meniscal injury.

Arthrography diagnosed anterior cruciate ligament injury only in 2 cases and none of posterior cruciate ligament injury. Arthroscopy confirmed 34 cases of anterior cruciate ligament injury and 2 cases of posterior cruciate ligament injury.

Table 2: clinical tests for stability of knee (n=50).

Parameters	*Number*	*Percent*
Stress varus	2	4
Stress valgus	4	8
Anterior drawer	31	62
Posterior drawer	1	2
Lachman	28	56
Pivot shift	7	14
Jerk sign	5	10
McMurray medial meniscus	28	56
McMurray lateral meniscus	10	20
Appley grinding	21	42
Appley distraction	8	16

Table 3: Comparison of arthrography and arthroscopy

Menisci	*Arthrography*	*Arthroscopy*
Medial	20	25
Lateral	13	21
Cruciate ligament Anterior	2	34
Posterior	0	2

In our study meniscal tear were picked in 66% of cases by arthrography while international study revealed 84%. Arthroscopically meniscal tear were diagnosed in 92% of cases while international study revealed meniscal tears in 86%. Cruciate ligament injury was revealed 4% by arthrography and 96% by arthroscopy while international study revealed cruciate ligament injury 97% by arthroscopy.

Table 4: Comparative analysis of arthrography and arthroscopy

Lesions	*Present Study*		*Ireland et al, 1980*	
	Arthro-graphy	*Arthro-scopy*	*Arthro-graphy*	*Arthro-scopy*
Meniscal	66	92	84	86
Cruciate ligaments	4	72	69	97

DISCUSSION

Clinical evaluation has a very important place in the diagnosis of meniscal and ligamentous injuries of the knee.[7]

In our society male spend more active life than females so they were more prone to injuries.

Young adults are more sports oriented and involved in driving motorbikes so age 21-30 years were involved. Right foot which is usually dominating so right knee 27 and left knee 23 were affected.

Mostly footballers were involved which sustain rotational injuries same findings were revealed by Kulthanan[8].

Anterior Drawer test was more valuable than Lachman test in our study but George et al in 1980 revealed Lachman more reliable than Anterior Drawer.[9]

In our study McMurray and Appley Grinding test revealed good coordination with meniscal tears.[10]

Arthrography gave 66% results in meniscal tears while international study picked 84% meniscal tears.

Our arthroscope picked up 92% meniscal tears

while international study picked 86%.[11]

In our study meniscal tears were picked in 66% of cases by arthrography. In the international study 84% of meniscal tears were picked up by arthrography. The reason being difficulty in interpretation of radiological findings.

A tear in posterior lateral corner of the lateral meniscus was difficult to diagnose because of passage of popliteus tendon.

Arthrographic diagnosis of torn cruciate ligaments was poor due to double contrast method in our study. It is better with single contrast arthrography.[12]

Our fluoroscopic unit was not equipped with lateral tomography so it was difficult to pick the cruciate ligament tears.[13] Less experience interpretation of the radiological finding in arthrography was also a factor.

Arthroscopically meniscal lesions were picked up in 92% of cases in our study. International study picked up 86% meniscal lesion. Our arthroscope picked 96% anterior cruciate ligament injuries while international was 97% it was comparable.

Our results of arthroscopy are comparable to international study due to increasing expertise in arthroscopy.

Arthroscopic diagnosis of cruciate ligament is much superior than arthrography. Arthroscopy is more practical as a diagnostic and therapeutic modality in meniscal and ligamentous injuries of the knee.

In our study the results of arthroscopy were better in the diagnosis of meniscal and cruciate ligament injuries than arthrography.

Arthroscopic diagnosis of cruciate ligament injuries is much superior than arthrography. So regarding diagnostic accuracy, cost effectiveness, availability and minimal complications arthroscopy is more practical as a diagnostic and therapeutic modality in meniscal and ligamentous injuries of the knee. Arthrography has important place in diagnosing the meniscal injuries of the knee. There was no infection, instrument breakage or thrombophelibitis.

CONCLUSION

1. Diagnostic accuracy of arthrography was greater in medial meniscus than lateral meniscal tears (80% vs 52%).
2. Diagnosis of torn cruciate ligament was poor with arthrography.
3. Arthrography is an out-patient procedure, requires no anaesthesia and is essentially devoid of complications
4. It is relative easy to perform, is reproducible and reliable with minimal radiation exposure to the patient and it is cost effective.
5. Diagnostic accuracy of arthroscopy for lateral meniscal tear was superior to that of arthrography (84% vs 52%).
6. For torn anterior cruciate ligament arthroscopic diagnosis was quite high (92%).
7. Arthroscopy is superior to arthrography interms of diagnostic accuracy and therapeutic potential.

There was no serious complication in any of the two procedures. Both procedures require experience for accuracy.

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