

Correlation of the Findings of Clinical Examination and Arthroscopy of Knee Joint under Local Anesthesia

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ABSTRACT

Objective: To study the correlation of the findings of clinical examination and arthroscopy of knee joint under local anesthesia

Study Design: Descriptive study

Place and Duration of Study: This study was conducted in the Orthopaedic Department, Railway Hospital Islamabad and Ibn e Siena Hospital & Research Institute Multan from March 2008 to March 2010.

Materials and Methods: This study was conducted in 50 patients with some type of problems in the knee since March 2008 to March 2010. 40 (80%) patients were diagnosed clinically, but clinically diagnosis was totally correct in 25 (50%) patients while 15 (30%) patients had additional arthroscopic findings besides those diagnosed clinically.

Results: With the help of arthroscopy the diagnosis was improved to 94% that is near the international study of 90%. The clinical diagnosis was entirely incorrect in 7 (14%) cases. In these cases the clinical diagnosis was wrong but correct diagnosis was apparent at arthroscopy. So arthroscopy should be considered as a diagnostic aid to use in conjunction with a good history, complete physical examination and appropriate roentgenograms. A high degree of accuracy combined with low morbidity, has encouraged the use of arthroscopy to assist in diagnosis, to determine prognosis and to provide treatment.

Conclusion: Arthroscopy under local anesthesia is highly economical, having good patient's acceptability and can be performed as a day case procedure. Meanwhile it is reliable, safe and well-tolerated alternative to conventional techniques to improve the diagnostic accuracy.

Key Words: Arthroscopy, Knee Joint, Anesthesia, Local

INTRODUCTION

The knee is one of the most commonly injured joint because of its anatomic structure, its exposure to external forces and its functional demands. The use of an optical instrument as a diagnostic aid came later in orthopaedic discipline as compared to other discipline such as Eye, ENT, Urology and Gynecology. Endoscopy was first introduced in orthopaedic surgery in Japan and it became possible to examine cadaver knee with optical instrument.² Arthroscopy did not come in practical usage in western world until 1970. As the first half of the seventh decade past, it became apparent that arthroscopy has been accepted as a valuable aid in the diagnosis and treatment of knee derangement. It has become a routine procedure in many centers of the world to evaluate and treat the knee problems.³ It is well established that arthroscopy provide useful information in chronic knee problems in which diagnosis and treatment is in doubt.⁴

The diagnosis of lesions of the knee joint has been based largely on recognition of the typical history and findings on the clinical examination. One of the causes of difficulty in diagnosing lesions of the knee joint lies in the fact that different lesions can produce identical findings and standard roentgenograms are non-

diagnostic. Even at arthrotomy, it can be difficult to be certain that all etiological causes are being properly visualized. For these reasons, diagnostic aid have long been sought and arthrography had been widely used as a mean to improve the diagnostic accuracy.

Arthroscopy in the beginning was added to the diagnostic technique for the evaluation of the knee problems. Improvements in instrumentation and advances in diagnostic techniques acquired simultaneously to make procedures more widely applicable. Arthroscopy does not decrease the importance of a thorough history and careful physical examination nor does it replace the need for sound clinical judgment.

Every patient must have clinical evaluation before any invasive procedure is performed. Such evaluation must include a thorough history, complete physical examination, appropriate laboratory studies and roentgenographic studies. When thorough arthroscopic examination is done to establish diagnosis, it substantially reduces hospitalization, post-operative morbidity and inflammatory response and provides improved follow up evaluation.⁵

The conventional way of arthroscopy of knee for diagnostic and surgical purposes is performed either under general anesthesia, spinal or epidural anesthesia.

For simple diagnostic arthroscopy, one had to admit the patient, carry out all investigations and needs the anesthetist and main operation table. Patients with knee problem had to wait long as more serious patients took most of the operating time. Now we are accommodating more patients than we use to do in previous years. Patients usually walk the theatre from preoperative room and after procedure walk out without going to the recovery room. Only few surgeons have reported the use of local anesthesia for arthroscopy.⁶

Diagnostic arthroscopy can be performed safely and reliably as an outpatient or day case procedure if the surgeon is experienced.⁷ Even in the best hands, the accuracy of the knee examination is 71% but by the diagnostic arthroscopy accuracy increase to 97%.⁸ This study will act as an improved guideline for the arthroscopy of knee joint along with comparative analysis with other studies and its correlation with clinical examination.

MATERIALS AND METHODS

This study was conducted in the Orthopaedic Department, Railway Hospital Islamabad and Ibn e Siena Hospital & Research Institute Multan, from March 2008 to March 2010. A total number of 50 patients with age between 15 to 60 years were included in the study. Patients having medical problems and those who did not gave consent of arthroscopy were excluded from the study. Their history was taken & examination was done to make provisional diagnosis which was confirmed arthroscopically.

The arthroscopy of all 50 patients was performed under local anesthesia without tourniquet as an outpatient procedure. All the patients were evaluated thoroughly by history, clinical examination and radiographically. Routine investigations like plane x-ray knee joint and blood complete with ESR, pre-anesthetic assessment and consent of the patient were obtained. The duration of arthroscopy was one to one and half hours.

The 20ml mixture of 2% lidocaine and 0.5% bupivacaine with ratio of 1:1 was used. 10ml of mixture was injected intra-articularly, 4ml into antero-lateral portal, 4ml into the antero-medial portal and the remaining 2ml into the supero-lateral portal for irrigation needle.

All operations were carried out under prophylactic antibiotics. First generation cephalosporin 1gm intravenously was used pre-operatively and was followed by 500mg TDS orally for four days and oral diclofenac 50mg TDS was used for pain relief. The patient was advised to have complete rest for at least 24 hours. Early static quadriceps exercise were started and stitches were removed on 12 to 14th postoperative day.

RESULTS

Our study included 50 patients having some sort of knee problems. Each patient had clinical diagnosis on

the basis of sufficient signs and symptoms before the arthroscopy was done.

The patients included in the study had age ranging between 15 to 60 years (average 35.5 years) and having no significant medical problems like chronic cardiovascular or respiratory disease. Male patients were 41 (82%) and female patients were 9 (18%). Male to female ratio was being 4:1. In 25 patients (50%) right knee was involved while in another 25 patients (50%) left knee was involved. (Table No.1)

The mechanism of injury in most of the cases was trauma (26 patients) including road traffic accident, twisting sport injury or fall on the ground. In our study of 50 cases, 24 patients had no history of trauma. 11 patients gave history of fall, 11 patients had history of twisting injury, 3 patients had blunt trauma while 1 patient had valgus strain. (Table No. 1)

Out of 50 patients, 39 patients were having pain and swelling of the knee and difficulty in walking. Swelling was mild in 17, moderate in 9 and severe in 3 patients. 7 patients had instability or giving way of the knee joint. 10 patients had history of locking of knee joint. History of fever associated with knee symptoms was present in 7 patients. Gait was normal in 27 patients, limping in 22 and one patient was unable to walk. Quadriceps atrophy was present in 43 patients. (Table No. 2)

Abduction or valgus stress test was positive in 3 and adduction or varus stress test positive was positive in 2 cases. Anterior drawer's test was positive in 6 cases. Pivot shift phenomenon was positive in 3 and jerk test was positive in 2 cases. McMurray test was positive in 18 cases (6 on medial rotation of foot and 12 on lateral rotation of foot). Appley's grinding test was positive in 13 cases and apprehension test was negative in all the patients. (Table No. 3)

Clinical diagnosis was based on history and thorough physical examination and then evaluated radiographically. Clinically 11 patients were found to have lateral meniscus tear or degeneration and 13 had medial meniscus tear or degeneration. Anterior cruciate ligament tear in 5, non-specific synovitis in 15, osteoarthritis in 15 cases were diagnosed. 4 patients were having established acute pyogenic arthritis that we had to lavage and biopsied in emergency. Radiological examination was normal in 38 patients. Osteoarthritic changes were seen in nine, soft tissue swelling in one, old chip fracture of lower pole of patella in one and haziness of the knee joint in one patient.

On arthroscopic examination, 8 patients were shown to have lateral meniscus tear or degeneration showing the accuracy of McMurray's test on medial rotation of foot to be 75% and 20 patients were seen to have medial meniscus tear or degeneration with accuracy of McMurray's test on lateral rotation of the foot to be 60%. (Table No. 3)

In 4 patients there was complete tear of anterior cruciate ligament while in one patient there was partial tear showing the accuracy of Anterior Drawer's test to be 82%. No posterior cruciate ligament tear was seen. (Table No. 3)

There was roughening of the articular cartilage of lateral and medial femoral and tibial condyles having degenerative joint changes in 19 cases and in 10 cases patello-femoral joint was involved.

Non-specific synovitis was seen in 20 cases and was confirmed later on histopathologically on arthroscopic biopsy. One patient not diagnosed clinically was seen to have villonodular synovitis and was confirmed on histopathological examination of the biopsy specimen. Chondromalacia patellae was seen in 2 cases.

Table No 1. The characteristics of patients with knee problems

| Characteristics | | No. of Patients (%) |
|---------------------|----------------|---------------------|
| Age | 15 – 30 yrs | 22 (44%) |
| | 31 – 45 yrs | 18 (36%) |
| | 46 – 60 yrs | 10 (20%) |
| Gender | Male | 41 (82%) |
| | Female | 09 (18%) |
| Side Involved | Right | 25 (50%) |
| | Left | 25 (50%) |
| Mechanism of Injury | Twisted Injury | 11 (22%) |
| | Blunt Trauma | 03 (06%) |
| | Valgus | 01 (02%) |
| | Fall on ground | 11 (22%) |

Table No 2: Associated signs & symptoms of patients with knee problems

| Clinical Signs & Symptoms | | No. of Patients (%) |
|---------------------------|----------|---------------------|
| Swelling | Mild | 17 (34%) |
| | Moderate | 09 (18%) |
| | Severe | 03 (06%) |
| Instability | | 07 (14%) |
| Locking | | 10 (20%) |
| Crepitation | | 15 (30%) |
| Fever | | 07 (14%) |
| Other Joint Involvement | | 01 (02%) |
| Limping Gait | | 22 (44%) |
| Quadriceps atrophy | | 43 (86%) |

One patient was having discoid lateral meniscus and one other patient was suspected of having medial meniscus tear on arthroscopy but could not be confirmed. Two cases, one suspected of medial meniscus tear and another of having intra-articular loose body was shown on arthroscopy to be the normal knee joints.

Clinical versus arthroscopic diagnosis was correct in 25 cases and incomplete or with additional arthroscopic findings in 15 cases. So the accuracy of clinical diagnosis that was judged by arthroscopic findings and

histopathology reports was up to 80%. Diagnosis was totally incorrect in 7 patients and in only 3 cases the interpretational of arthroscopic examination was nonconclusive. So the accuracy of our arthroscopic diagnosis was up to 94%. (Table No. 4).

Table No 3: Percentage accuracy of the clinical tests in knee examination

| Clinical Tests | | No. of Patients |
|-----------------------------|--|-----------------|
| Stress Test | | |
| | Clinically Positive Test | 05 |
| | Arthroscopically Collateral Ligament Tear | 03 |
| | Percentage Accuracy | 60% |
| Anterior Drawer Test | | |
| | Clinically Positive Test | 06 |
| | Arthroscopically ACL Tear (Complete) | 04 |
| | Arthroscopically ACL Tear (Partial) | 01 |
| | Percentage Accuracy | 83% |
| McMurray Test | | |
| | Clinically Positive Test on Medial Rotation of Foot | 06 |
| | Arthroscopically Lateral Meniscus Tear | 08 |
| | Percentage Accuracy | 75% |
| | Clinically Positive Test on Lateral Rotation of Foot | 12 |
| | Arthroscopically Medial Meniscus Tear | 20 |
| | Percentage Accuracy | 60% |
| | Aggregate Percentage | 67.5% |

Table No 4: Correlation of the clinical and arthroscopic diagnosis of knee

| | No. of Patients |
|----------------------------------|-----------------|
| Correct Diagnosis | 25 |
| Incomplete Diagnosis | 15 |
| Incorrect Diagnosis | 07 |
| Suspected Arthroscopic Diagnosis | 03 |
| Correct Clinical Diagnosis | 80% |
| Correct Arthroscopic Diagnosis | 94% |

DISCUSSION

This study was conducted on patients having knee problems. Out of 50 patients, youngest patient was 15 years old with synovitis of the supra-patellar pouch of left knee joint while the oldest patient was 60 years old having tuberculous synovitis with secondary osteoarthritis of left knee joint. Maximum number of patients belong to the age group was between 21 to 30 years.

Above 40 years, the incidence of the traumatic knee problems due to road traffic accident or sport injury falls. These patients mostly presents as cases of

osteoarthritis of the knee secondary to old untreated or improperly treated knee derangements. It is only in the late teen that some youngsters present with sign and symptoms of knee problems especially after some sports injury.

In fact there is no age group in which arthroscopy of the knee joint has no place. Thus in our study of 50 cases with age of the patients ranges from 15 to 60 years, with mean age of 35.52 years and the peak age of 21 to 30 years. Male to female ratio was about 4:1. In our society there is less exposure of ladies to traffic, industrial, sports and other type of hazards because most of the time our women stay at home and perform domestic work as compared to western women life style.

In our study of 50 cases, 22 patients gave history of trauma to knee joint after fall in road traffic accident or during sports injury, 3 patient sustained blunt trauma to the knee joint while 1 patient had valgus strain of the knee joint while walking. Over all in our study, the incidence of trauma related to knee problems as compare to western countries was quite low. The reason was that a wide variety of conditions effecting the synovium, such as tuberculous synovitis, synovial chondromatosis, and pigmented villonodular synovitis rarely presents with any history of trauma. It was only in the younger patients with torn menisci, cruciate ligament insufficiency, chondral fracture who gave history of preceding trauma in almost all the cases. Older patients with a long history of knee problem may or may not remember the incidence of trauma as the initiating cause of their problem. In 40 out of 50 cases there was full positive correlation between the clinical diagnosis and findings at the arthroscopy. In other words the clinical diagnosis was correct in about 80% of the cases.

Out of 40 cases in which the clinical diagnosis was correct, in 25 cases arthroscopy served to confirm the diagnosis but did not directly influence surgical management. In 15 cases the clinical diagnosis was incomplete and the additional diagnosis was made with the help of arthroscopy.

It is a clinical practice to diagnose a single condition which gives most striking features while knee may have other lesions masked by sign and symptoms of a one. For example one case diagnosed clinically as anterior cruciate ligament deficiency, was subjected to diagnostic arthroscopy. Arthroscopic examination revealed, besides a tear of the anterior cruciate ligament, a lateral ligament injury. In one patient with a palpable intra-articular loose body in the supra-patellar pouch, when examined arthroscopically revealed multiple loose bodies in the joint and were removed by mini arthrotomy. Diagnostic arthroscopy improved the clinical diagnosis in these cases and as a result a better planning could be made for arthrotomy incision.

The clinical diagnosis was entirely incorrect in 7 cases. In these cases the clinical diagnosis was wrong, but the correct diagnosis was apparent at arthroscopy. In 3 cases, the arthroscopic examination was non-conclusive. In one case due to mild intra-articular bleeding, structures could not be visualized in spite of joint lavage. Arthroscopic biopsy was taken which showed traumatic synovitis on histological examination. In another case, there was slight discoloration of the femoral condyle but diagnosis was doubtful. Another patient had suspected medial meniscus tear on arthroscopy but the result was not conclusive. In these 3 cases, we were unable to diagnose or treat the condition arthroscopically.

Many different techniques of local anesthesia have been described. We have used half the recommended dose of local anesthetics, so that the serum level of lignocaine and bupivacaine remain well below the limit of toxicity.⁶

The problem of poor visibility was controlled with frequent wash out with normal saline. A 23G infusion set needle was used as an irrigation needle so that the joint remains distended and the tamponade effect of normal saline prevented the bleeding in the knee. Furthermore the use of adrenaline in lignocaine prevented troublesome bleeding in the knee joint. Arthroscopy under local anesthesia is economical and save manpower and time. It requires no special equipment, per-operative investigations, postoperative care and hospitalization. Meanwhile it is reliable, safe and well-tolerated alternative to conventional techniques.⁵

An arthroscopy routinely is performed like an operation that is to stay in an operating theater under aseptic precautions as we practice during other major surgical procedures. The general anesthesia ensures adequate muscle relaxation so that varus and valgus stress can be applied to the knee during examination without giving the patient discomfort. But during arthroscopy under local anesthesia, all patients may have some discomfort while manipulating the joint. In co-operative patients, local anesthesia can be used.

Proper irrigation with a physiological saline solution is important in order to ensure and unobscure the image. Even minute quantity of blood that could obscure the image should be washed away. The instrument is preferably inserted on the anterolateral side. To make the various structures visible, manipulation is necessary. If the proper instruments are used, the technique of arthroscopy can be learned without too much difficulty but interpretation of the observation requires experience.

In this study of 50 cases, the role of arthroscopy was assessed both in the diagnosis and treatment of these cases in our set up. Arthroscopy is mandatory for accurate and complete diagnosis of the knee joint. In our series of 50 cases, arthroscopy was done for diagnostic purposes. The efficacy and patient

acceptability of arthroscopy of the knee joint under local anesthesia was assessed. The accuracy of arthroscopic diagnosis in our series came to be about 94%, which is little lower than reported in international studies (97% in study of Curran & Woodward and above 90% in study of Oberlander M A, Shalvoy R M, Hughstone J C).^{8,9} This is because we have recently established arthroscopy units and our experience is much less than the developed centers of the western world.

The accuracy of clinical diagnosis is 80% less than that of arthroscopic diagnosis. This shows superior role of arthroscopy in the diagnosis of the knee problems.¹⁰ The only difficulty with the use of arthroscope was the high skill of triangulation required in more complicated arthroscopic procedures.¹¹ This is definitely a matter of experience which comes with regular use of the technique for a long time. We feel therefore that arthroscopy is probably the most normative special examination now available for the diagnosis of the "Knee problem", we would stress that the technique, while relatively simple, requires time and patience to learn.^{12,13} Accuracy comes only with experience and the occasional arthroscopies might well become discouraged. For this reason we advocate that the technique must be put into the hands of more individuals in a medical community.

In case of arthroscopy under local anesthesia, the patient was called for arthroscopy on the day of operation and was discharged after the completion of the procedure. The short stay reduced the hospital cost which is beneficial both for the patient and economy of the country. Diagnostic arthroscopy performed on outpatient basis results in rapid turnover of patients. Arthroscopy was found to be associated with low morbidity. Most of the patients after arthroscopy were able to stand and walk on the same night. This is because of smaller incision and less inflammatory response. This result in fast rehabilitation of the patients.^{14,15}

Arthroscopy performed under local anesthesia was found to be having good efficacy and patient's acceptability. It is highly economical and safe, saving manpower and time. It requires no special pre-operative investigations, post-operative care and hospitalization.¹⁶

CONCLUSION

Arthroscopy under local anesthesia is highly economical, having good patient's acceptability and can be performed as a day case procedure. Meanwhile it is reliable, safe and well-tolerated alternative to conventional techniques to improve the diagnostic accuracy.

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