

Arthroscopic findings in mechanically injured knee

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ABSTRACT

This is a prospective study was carried out in Basra general hospital to show the usefulness of arthroscopic examination in evaluating the sensitivity and specificity of clinical examination and magnetic resonance imaging finding in mechanically injured knee a total of 120 patients with mechanically injured knee were included in this study and all the patients were admitted to orthopedic department of surgery one day before arthroscopy there were 114 male and 6 female and male affected more than female and there Age range was 10 – 49 years and the commonest age group affected by M I K are young 20 – 25 years ,and all the patients admitted to the Orthopedic department one day before arthroscopy. careful history was taken from all the patients and thorough clinical examination was done for all the patients including special tests for each particular structure and the commonest presenting features were pain swelling locking pop crepitus felling of instability giving way then i sent all the patients for standard roenterographic studies and magnetic resonance imaging and finally they underwent arthroscopy. The anterior cruciate ligament alone was the commonest structure injured, while the anterior cruciate ligament in combination with the medial meniscus where the commonest combined lesion. Unprofessional football players were the commonest people injured. This study advice good training for unprofessional football players and physical fitness is essential to reduce the incidence of sport knee injury.

Key words: MRI, PCL, ACL.

INTRODUCTION

Arthroscopy is a surgical procedure in which a small fiber optic telescope (Arthroscopy) is inserted into a joint fluid is then inserted into the joint to distend the joint and to allow for the visualization of the structures within the joint. Usually the surgery is viewed on a monitor so that the whole operating team is a ware of the type of the surgical procedure that is being performed⁽¹⁾.

Arthroscopies are approximately (5mm) in diameter so the incisions are very small approximately (1inch).

The most common types of Arthroscopic surgery include removal or repair of a torn meniscus (cartilage), ligament reconstruction, removal of loose debris and trimming damaged cartilage⁽¹⁾.

Arthroscopic surgical procedures are often performed on an outpatient basis and the patient is able to return home on the same day

The arthroscopic findings in mechanically injured knee include the following lesions:

- (1) meniscal injuries.
- (2) lijamentous injuries.
- (3) Osteochondral lesions.

Incidence

The current emphasis on health and fitness has resulted in an active population and an increase incidence over use and traumatic knee injuries. According to the national center of health statistics, the average number of annual visits to an orthopedic surgeon has increased by (28%) over the past (20) years (from 11.3) to (14.5) per (100) persons⁽²⁾.

Anatomy of the knee joint

The Knee Joint is the largest and most completed joint in the body. Basically it consists of two condylar joints between the medial and lateral condyles of the femur and the corresponding condyles of the tibia and a gliding joint between the patella and the patellar surface of the femur. Note that the fibula is not directly involved in the joint⁽³⁾. The joint between the femur and tibia is a synovial joint of a hinge variety but some degree of rotatory movement is possible. The joint between the patella and femur is a synovial joint of the plane gliding variety.

Biomechanics of the knee joint

The cruciate ligaments enable the knee to both roll and slide for maximum motion while maintaining contact, and the collateral ligaments provide side to side stability, the menisci increase the contact surface area between the femoral condyles and the relatively flat tibial plateau on the medial side, and the convex tibial plateau on the lateral side. and therefore play an important role in load transmission⁽⁴⁾. The meniscus also helps the anterior cruciate ligament to stabilize the knee. Just as a block placed behind the wheel of a car prevents it from rolling the body of the meniscus prevents the femur from gliding too far of the tibia⁽⁵⁾.

Biomechanical investigations have demonstrated that the anterior cruciate ligament fiber bundles are not isometric throughout flexion and extension. During knee flexion, the tension in the anteromedial bundle increases while the posterolateral bundle relaxes. During knee extension, the posterolateral bundle tightens while the tension in the anteromedial bundle decreases⁽⁶⁾.

One important function of the patella is to increase the power of extension, it lifts the quadriceps forwards, thereby increasing its moment arm⁽⁷⁾. Rotation between the tibia and femur occurs automatically between full extension (0°) and (20°) of knee flexion⁽⁸⁾.

Primary and secondary stabilizer of the knee joint

- 1) primary, Anterior cruciate ligament, posterior cruciate ligament, medial collateral ligament (superficial), lateral collateral ligament
- 2) secondary, iliotibial band, medial meniscus, posterior capsule, popliteus⁽⁹⁾.

Aim of the Study:

To show the usefulness of arthroscopic examination to evaluate the sensitivity and specificity of clinical examination and magnetic resonance imaging in mechanically injured knee.

PATIENTS AND METHOD

A total of 120 patients with mechanically injured knee were included in this study. There were 114 male and 6 female and the age range was (10-49) years and all the patients were admitted to the orthopedic department of surgery one day before arthroscopy. I took a careful history from all the patients and did thorough physical examination for them including general and local examination of the knee joint like pain, swelling, effusion, popping, abnormal function, locking, giving way and special tests for each particular structure. Then I sent the patient for special lab investigations including hemoglobin, erythrocyte sedimentation rate, Blood urea, uric acid and random blood sugar and I sent them for special roentgenographic studies of the knee joint and magnetic resonance imaging. Finally all patients underwent arthroscopic examination under general anesthesia.

The procedure

I admit the patient to the hospital one day before operation to reevaluate him clinically and to compare clinical findings with MRI findings. I completed his lab investigations, shaved the site of operation and did a marker for the injured knee joint.

On the day of operation I did for him arthroscopy in the theatre under general anesthesia and under a full aseptic technique.

I placed the patient supine on the slanted operating table with knee joint positioned slightly past the distal break part of the table. The end of the table is dropped so that both limbs will dangle at 90 degree.

Before induction of anesthesia we give for him intravenous antibiotic, after induction of anesthesia we apply esmarch tourniquet to the knee joint, I hold the knee joint that is examined on lateral support. I elevate the other knee joint by putting a sand bag below it to prevent injury to the common peroneal nerve, femoral nerve by stretching or

compression, then sterilize the limb from the foot to the tourniquet and draped it, the portal of entry is determined either anteromedial or anterolateral approach, do a small stab wound by a small knife under high pressure the normal saline is delivered into the knee joint via the arthroscope the entrance of trocar should be in a screw like manner, pass beneath the patella and then change the direction into the suprapatellar pouch i instillate water into the suprapatellar pouch until the pressure inside and outside the joint will be equal at first rapid and then manifested by dropping then we start examination of the knee joint in the standered pateren , at the end of arthroscopy we evacuate the knee joint ,remove the tourniquet and apply a pack pressure then we apply afirm Watson jones dressing, then the patient is transferred to the recovery room and then to the ward after two hours the patient can go home but i advice him not to walk with a full weight bearing and to visit me after 5 days to reexamine him and to report for any complication arise.

RESULTS

Table (1): Distribution of the patient according to the gender

Gender	Number of patients	Percentage
Male	114	95%
Female	6	5%
Total	120	100%

Table (2): Distribution of patients according to C age group

Age group years	Number of patients	Percentage
10-19	20	16.66%
20-29	80	66.66%
30-39	10	8.33%
40-49	10	8.33%

Table (3): Distribution of patients according to the sport practicing

Sport activity	Number of patients	Percentage
Professional	16	13.33%
Unprofessional	64	53.33%
No sport activity	40	33.33%
Total	120	100%

Table (4): distribution of patients according to mechanism of injury

Single major trauma	86	71.66%
Minor repetitive truma	16	13.33%
Road traffic accident	18	9%
Total	120	100%

Table (5): Distribution of patients according to the type of lesion

Type of lesion	Number of patients	Percentage
Single lesion	68	56.66%
Combined lesion	36	30%
Others	16	13.34%
Total	120	100%

Table (6): Distribution of the patients according to the structure involved

Structure involved	Number of patients	Percentage
Anterior cruiate lig	42	35%
Port cruiate lig	4	3.33%
Medial meniscus	18	10%
Lat meniscus	4	3.33%

Table (7): Distribution Of patients with anterior cruciate ligament injuries according to the type of bundle involved

TYPE OF TEAR	Number of patients	Percentage
Partial tear	30	71.43%
Complete tear	8	19%
Lax rudent anterior cruciate ligament	4	9.52%
Total	42	100%

Table (8): Distribution of patients with anterior cruciate ligament injuries according to the type of tear

Type of bundle injured	Number of patients	Percentage
Antero medial bundle	14	33%
Postenolateralbundle	28	66%
Total	42	100%

Table (9): Distribution of patients with medial mesical injuries according to the type of tear

Type of tear	Number of patients	Percentage
Partial tear	10	55.55%
Bucket bundle tear	8	44.44%
Total	18	100%

Table (10); Distribution of the patient with medialmesical injury according to the site of tear

Site of tear	Number of patients	Percentage
Anterior horn	6	33.33%
Posterior horn	12	66.66%
Total	18	100%

Table (11): Distribution of the patients according to the combined structures involved

Structure involved	Number of patients	Percentage
Anterior cruciate ligament and medial meniscus	24	20%
Anterior cruciate ligament and lateral meniscus	8	6.66%
Anterior cruciate ligament, medial meniscus and lateral meniscus	2	1.66%
Anterior cruciate ligamentposterior cruciate ligamentmedial meniscus	2	1.66%

Table (12): Distribution of the patient according to miscellaneous injuries

Type of Disease	No of patients	Percentages
Osteoarthritis	4	3.33
Osteochondral Discus	2	1.66
Loose body	4	3.33
Ligament laxity	2	1.66
Dislocation of the knee	2	1.66
Anterior tibial spine fracture	2	1.66

Table (13): Sensitivity and specificity of clinical examination and magnetic resonance imaging for various lesions

Structure involved	Clinical findings		Magnetic resonance Image finding	
	Sensitivity	specificity	Sensitivity	specificity
Anterior cruciate ligament	94.44%	95.23%	89.23%	97.5%
Posterior cruciate ligament	100%	98.3%	100%	98.3%
Medial meniscus	87.5%	98.11%	87.5%	98.11%
Lateral meniscus	100%	94.3%	100%	98.3%
Anterior cruciate ligament and lateral meniscus	70%	10.11%	100%	100%
Anterior cruciate ligament and Medial meniscus	88.88	94.11%	88.88%	94.11%
Anterior cruciate ligament Posterior cruciate ligament and Medial meniscus	100%	100%	100%	100%
Anterior cruciate ligament Medial meniscusand lateral meniscus	100%	100%	100%	100%

Note

i found the sensitivity and specificity for each structure as follow:

$$\text{Sensitivity} = \frac{\text{ture positive}}{\text{all postive}} \times 100 \quad \text{Specificity} = \frac{\text{true negative}}{\text{all negative}} \times 100$$

DISCUSSION

In this study i found males were more frequently affected than female because in our locality males were engaged in high physical activities and they practice sports more than females the ratio of male to female was 20:1, this is in comparison with a study of bradelys baker he found the ration of male to female was 2.5:1⁽¹¹⁾.

I found also the commonest age group were (20-29) years old injured because they are active group in the community, this is in comparison with a study of bradelys baker he found the commonest age group were (31-40) years old⁽¹¹⁾.

This study showed that 80 (66.66%) patients were practicing sport activities while the remaining 40 patients were not practicing sport activities this is in comparison with a study of David levy he found that the sport activities accounts for about (60%) of knee injuries⁽¹²⁾.

This study showed that the anterior cruciate ligament is the commonest single lesion 42 (35%) and this finding agree with a study of David levy⁽¹²⁾.

In this study also i found that the medial meniscus was more commonly injured 18 (10%) than the lateralmeniscus 4 (3.33%) because the medial meniscus is also attached to the medial collateral ligament and is relatively immobile and this agree with a study of David levy⁽¹²⁾.

In this study i found the sensitivity and specificity of clinical findings for the anterior cruciate ligament were (94.44%) (95.23%) respectively.

While the sensitivity and specificity of magnetic resonance image findings for the anteriorcruciate ligament were (89.47%), and (97.5%) respectively this is in comparison with a study of zairul-nizam the accuracy of M R I in detectingcruciate ligament tears was (80-96%) against (82-93%) for clinical examination Zairul Nizam et al 2000⁽¹³⁾.

The sensitivity and specificity for of clinical findings for the posterior cruciate ligament were (100%) (98.3%) respectively and the sensitivity and specificity of the M R I finding for the P C L were (100%) (98.3%) respectively these high degrees of sensitivity and specificity is due to both high clinical experience and to a little number of patiensts.

This is in a comparison with a study of Zacrul-Nizam et al 2000 he reported that the sensitivity and specificity of M R I for various knee structures varied from one study to another but in general it was high.

The sensitivity and specificity depends on who is doing the CE and concequently the M R I scan request and also on the expertise of who is interpretating the images there seems to be a marked contrast in normal versus abnormal findings when the request is made by anon orthopedic doctors Sherman et al 2000⁽¹⁴⁾.

In this study the sensitivity and specificity of M R I for meniscal injuries were medial meniscus (87.5%), (98.11%) while for lateralmeniscus (100%) (98.5%) respectively, while the sensitivity and specificity of clinical examination CE for meniscal lesions were medial meniscus (87.5%), (98.11%)respectively while for lateralmeniscus were (100%), (98.3%) respectively this is in comparison with a study of Zairul-Nizam et al 2000⁽¹³⁾.

Who found that the sensitivity and specificity of M R I for meniscal injuries were (80-84%) compared to (48-65%) for clinical examination.

Another study which was done by fischer he found the M R I is both sensitive and specific for meniscal tears accuracy is approximately (90%)⁽¹⁵⁾.

Regarding the statistical study we found it significant only for the Anterior Cruciate ligament (while for the others it was not significantbecause the number of patients involved in the study were relatively little and the period of the study was relatively short.

M R I may reveal abnormalities that were not suspected on the clinical examination and thus may influence treatment ,although M R I is very helpful for discovering abnormalities it can not differentiate lesions, as such M R I is not always helpful for determining atreatment plan⁽¹⁶⁾.

Regarding the complications of arthroscopy during my study were (1.2) infection, (2.1) reflex sympathetic dystrophy (1.2) ligament injury this is in comparison with a prospective study of small, s 1988 he found a complication rate of (1.68%) in (10.262) procedures. the common complications in this study were haemarthrosis (60%) infection (12.1%)

Thromboembolic disease (6.9%), anesthetic complication, ligament injury (1.2%), mulhollan reported a (0.3%) incidence of broken instrument⁽¹⁷⁾.

CONCLUSION

1. Clinical examination is of great validity and informative i should not bypass it, particularly repeated physical examination on different occasions is more valid than initial single examination.
2. Magnetic resonance image can't replace the clinical examination but it accomplish it and we should omit it as diagnostic measure in mechanically injured knee.
3. Magnetic resonance image is helpful in assessing variety of intra articular and extra articular disorders.
4. The anterior cruciate ligament alone was the commonest structure injured, while the anterior cruiate ligament in combination with the medial meniscus were the commonest combined lesion.
5. Unprofessional football players were the commonest people injured.

RECOMMENDATION

- 1- I recommend good training for unprofessional football players.
- 2- I recommend to culture the field of the stadiums with grass to decrease the knee injuries.
- 3- I provide every football team with a medical staff to manage the injured players.
- 4- Physical fitness is essential to reduce the incidence of sport knee injury.
- 5- Protective splint is essential to prevent trauma it requires carefull study.

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