

Arthroscopy in Traumatic Hemarthrosis of Knee

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Abstract

Background: The majority of acute traumatic hemarthroses of knee are due to anterior cruciate ligament (ACL) injury. However, their frequency and associated knee injuries in Iranian patients are not studied by arthroscopic examination, yet.

Objectives: The authors planned an arthroscopic study of acute traumatic hemarthrosis of knee in patients with insufficient symptoms, signs to exact diagnosis.

Methods: A consecutive series of patients with acute traumatic hemarthrosis of knee and no fracture around knee joint referred to Imam Khomeini hospital, Tehran, Iran from December 2006 to December 2009, were evaluated. Patients with early-onset knee hemarthrosis and insufficient physical examinations were included in the study. Patients under local or regional anesthesia underwent arthroscopic examination.

Results: Over a 36-month period, 43 consecutive patients (male 39, female 4) with mean age of 27.21 ± 7.22 years (age range of 16 to 49 years) were evaluated. Average time between the injury and Arthroscopy was three weeks (from one to four weeks). Falling and Sport injuries were the most common modes of injury, and right knee was injured most frequently. The most common arthroscopic findings were rupture of the ACL (77.3%). The most common complaints were Knee swelling (84.1%), pain (77%) and giving way (27%). Under anesthesia, 17 (38.6%) patients had negative anterior and posterior drawer and other laxity tests.

Conclusions: In patients with posttraumatic hemarthrosis of knee, surgeons could diagnose the injury etiology by taking history, physical and MRI examinations, but in case of doubts, the surgeon can perform an arthroscopy which is a minimally invasive and effective technique for correct diagnosis and proper treatment to prevent later complications such as meniscal tear and injury to the cartilage.

Keywords: Knee, Hemarthrosis, Arthroscopy, Anterior Cruciate Ligament

1. Background

The knee joint is one of the largest joints of the human body. Although very stable, it is one of the most frequently injured joints. Knee ligaments play a significant role in joint stability at the expense of vulnerability to diversity of injuries. Anterior cruciate ligament (ACL) is the most injured knee structure, which in the knee sprains may be considered benign. If this tear is left untreated, later it may lead to muscular atrophy, osteoarthritis and even acute injuries such as meniscal tear (1). Thus, correct diagnosis of knee injuries helps the patient to lie in the right therapeutic path, instead of losing the golden time of treatment. Although, imaging methods such as magnetic resonance imaging (MRI) provide valuable information, arthroscopy is the diagnostic gold standard. Arthroscopy is considered as an invasive diagnostic method, but in addition to precise diagnosis, it provides a clear image of the intra-

articular structures and the possibility of therapeutic procedures (2).

The majority of knee injuries associated with acute knee hemarthrosis are due to ACL injury (2-4), but the frequency of this injury and its associated knee injuries in Iranian patients are not studied by arthroscopic confirmation, yet. The approach of choice to manage traumatic swellings of knee in the emergency department (ED) is not determined.

2. Objectives

Authors planned an arthroscopic study of acute traumatic hemarthrosis of knee in patients with insufficient symptoms and signs to exact diagnosis.

3. Methods

The current study was approved by the institutional review board of the Imam Khomeini hospital, Tehran, Iran. All subjects signed written informed consent approved by the institutional review board before participation.

The current prospective study was conducted in Imam Khomeini hospital, Tehran, Iran from December 2006 to December 2009. A consecutive series of patients with acute traumatic swelling of knee referred to the ED or orthopedic clinic who met the following inclusion criteria were studied. Patients with aspiration confirmation of hemarthrosis, early-onset knee hemarthrosis and insufficient physical examinations did not lead to the exact diagnosis. Exclusion criteria were systemic diseases, gross joint laxity, patellar dislocation (confirmed by apprehension test and radiographs) and recent or old fractures around the knee joint (confirmed by radiographs).

After history taking and systemic examination, patients demographic data, detailed history of trauma and its mechanism and X-ray findings was filled for each knee joint results of knee examinations under anesthesia including gross and specific knee tests: anterior drawer test (ADT), Lachman (5), varus and valgus stress tests for collateral ligaments, pivot shift for ACL (6), posterior drawer test (PDT) for posterior cruciate ligament (PCL) and X-ray findings was filled for each knee joint were recorded by a questionnaire.

Patients were informed about their injury, possible knee derangements associated with a probably benign appearing knee trauma and its consequences, different management strategies, arthroscopic surgery and its Cons and Pros. Patients were examined under local or regional anesthesia in an operating room and underwent arthroscopic examination by two surgeons as early as possible (within three weeks on average). A standard set-up was used, with large-bore high flow irrigation, but no pump. A tourniquet was used in most cases. All joint compartments were examined and probing was always done. Meniscus tears were trimmed or repaired. Joint debris, synovial hypertrophies, and patients with ACL tear underwent ACL reconstruction.

4. Results

From 2006 to 2009, a total of 43 patients (39 males and 4 females) underwent acute arthroscopic examination in ED after the acute knee trauma. The mean age of the patients was 27.21 ± 7.22 years, ranged 16 - 49 years. Two major mechanisms of knee injuries were sport injuries (such as football, volleyball and wrestling) and falling (from a height), which along with car crashes were associated with more ACL injuries than other mechanisms (Table 1). Right

knee (65.5%) was most frequently injured than left knee (34.1%). In the current study the most frequent complaints were knee swelling (84.1%), pain (77%) and giving way (27%) (Table 1).

Table 1. Patients Characteristics

Variable	Frequency	Percent
Gender		
Male	39	90.6
Female	4	9.4
Injury Mechanisms		
Sport	14	31.8
Falling	13	29.5
Traffic accidents	6	13.6
Direct trauma	5	11.4
Simple sprain	6	13.6
Injured Knee		
Right	29	65.5
Left	15	34.1
Complaint		
Knee swelling	36	84.1
Pain	33	77.0
Giving way	12	27.0

Under anesthesia, 17 cases (38.6%) had negative ACL or PCL and other laxity tests; although 27 (61.4%) had at least one positive ACL test (Table 2). Arthroscopic knee examination revealed 34 (77.3%) ACL injuries, among which eight (18.2%) were isolated. The most common associated injury with ACL tearing was menisci (medial menisci: 34.1% and lateral menisci: 6.8%). Types of ACL injuries are presented in Table 2. Two PCL tears were found in cases with more severe impacts (road traffic accident, and direct trauma), accompanied by ACL and medial menisci or collateral ligament injuries. Figure 1 compares the frequency of arthroscopic findings in all subjects.

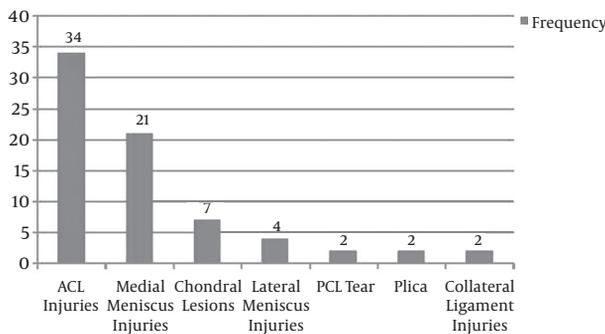
5. Discussion

Distortion or contusion of the knee is a common trauma in both sports and non-sports related activities. The annual incidence of knee injuries were 110 per 10 000 inhabitants with every tenth injury leading to a surgical consultation to assess the need for operative treatment (5). Traumatic haemarthrosis of knee presents diagnostic difficulty in acute injury stage, it limits knee investigation and

Table 2. Arthroscopic Examinations and Ligament Tests Under Anesthesia Findings

Variable	Frequency	Percent
Injury type		
Complete tear	27	61.3
Partial tear	3	6.8
Laxity	2	4.5
Old tear	1	2.3
Bleeding in ACL sheath	1	2.3
Test result		
ADT	26	59.09
Lachman	25	56.81
Pivot shift	22	50
PDT	1	2.27
Varus and valgus stress	6	13.63

Abbreviations: ADT, anterior drawer test; ACL, anterior cruciate ligament; PDT, posterior drawer test.

**Figure 1.** Comparison of Arthroscopic Findings

it should be disabled because of the pain. Nowadays, patient with acute knee haemarthrosis should be definitely admitted to orthopedic or trauma surgery department (6).

In the current study, at least one ACL test under anesthesia had positive result in 61.4% of cases, and also ADT and the Lachman tests were more accurate ACL tests. This finding was consistent with those of some studies by Noyes et al., Butler et al., Casteleyn et al. and Hardaker et al. In these studies, they reported that under anesthesia, the Lachman test was the most reliable one (1-4). Hardaker et al. reported Patients' responses to preoperative anterior drawer, pivot shift, and Lachman tests were within normal limits in 18%, 29%, and 73% of cases, respectively (4). However, Maffuli et al. found pivot shift test slightly better (7). They were unable to perform pivot shift test primarily on some of the patients because of pain and protec-

tive guarding, however with general anesthesia it was possible to elicit this test (1, 3, 4). Ostrowski et al., conducted a meta-analysis of 17 studies on accuracy of physical diagnostic tests to assess ruptures of the ACL. According to the predictive value statistics, they reported that during the physical examination, a positive result for the pivot shift test is the best to rule in an ACL rupture, whereas a negative result to the Lachman test is the best to rule in an ACL rupture. Also they concluded that, solely using sensitivity and specificity values, the Lachman test is a better overall test in both ruling in and ruling out ACL ruptures (8).

According to the current study findings, ACL was the most injured knee structure in traumas not leading to bone fracture and the most prevalent source of bleeding in the knee injuries. This finding was consistent with those of the studies by Noyes et al., Casteleyn et al., Sarimo et al., Fanelli et al., Bilik et al., Stanitski et al. and Sperner et al. (1, 3, 5, 6, 9-11).

The most common associated injury with ACL tearing was menisci, which was consistent with the results obtained by Noyes et al. and Casteleyn et al. (1, 3). The current study found 2 (4.5%) PCL tears. It was considerably lower than the incidence of 44% reported by Gregory et al. A probable reason for the lower incidence of PCL injuries in sport traumas in comparison to those of other traumatic injuries is the mechanism of injury. This result was similar to that of the reported incidence of 1% - 23% in the literature (3, 12-14).

The importance of correct diagnosis and early treatment in patients with hemarthrosis of the knee are demonstrated in various studies (3, 15-17). It is emphasized that undiagnosed and untreated knee injuries have poor outcomes. Experience gained in evaluating post-traumatic hemarthrosis of the knee suggests that clinical examination alone may not demonstrate the severity of many of these injuries. According to the findings, it was concluded that examination under anesthesia plus arthroscopy allows a more accurate diagnosis of acute traumatic hemarthrosis of the knee. However, in a study on a total of 85 injured knees over a 125-week period, Hardaker et al., concluded that arthroscopy is invaluable to determine the existence of other injuries with or without an associated ACL tear (4).

Swelling, pain and various degrees of inability to move the knee following the trauma are common early signs. The most frequent complaints in the current study were swelling, pain and giving way which were similar to the results reported by Noyes et al. (1).

In daily practice when a patient presents a history of knee trauma, swelling, pain and episodes of giving way complains of chronic pain and signs of knee joint arthrosis. Early diagnosis of knee hemarthrosis and arthroscopic

examination cuts out this unhappy phenomenon. Early diagnosis of ligament derangements, particularly ACL, helps accurate and proper management. The current study confirmed ACL as the most injured knee structure in traumas not leading to bone fracture and as the most prevalent source of bleeding in knee injuries.

The current study had some limitations: first, its cross-sectional nature did not allow conclusions of causality on the observed associations. Second, the sample size was relatively small. One of the reasons was that, nowadays new technologies and devices such as MRI are widely used in diagnosis especially in knee injuries, and the patients which diagnosis was confirmed by physical examination or MRI were not included in the study.

5.1. Conclusions

In a patient developing knee hemarthrosis after trauma, the surgeon can diagnose the etiology with history taking, physical examination and MRI, he (she) can treat it, but in the case of doubts, the surgeon can perform an arthroscopy which is a minimally invasive procedure that could be done under local or regional anesthesia to make a correct diagnosis and proper treatment to prevent later complications such as meniscal tear and injury to cartilage.

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