Arthroscopy of the acute traumatic knee in children

Prospective study of 138 cases

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We performed diagnostic arthroscopy for acute knee trauma in 138 children and adolescents aged 13 (1–15) years. The compatibility between the clinical examination and the arthroscopic findings was 59 percent. Ligament injuries were found in 32 cases, 14 of which had rupture of the anterior cruciate ligament. The compatibility in the case of ligament injuries was 31 percent. 48 patients had dislocation of the patella, and a displaced osteochondral fragment was seen in 19, 14 of which were radiographically silent. In 37 cases of distortion of the knee a correct diagnosis would have been missed unless arthroscopy had been performed. Arthroscopy is therefore indicated in children with severe distortion of the knee, hemarthrosis and with dislocation of the patella.

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Arthroscopy is an essential diagnostic tool for the management of knee trauma in children, where it is of greater importance than in adults, as history and clinical diagnosis may be difficult (Dandy 1986). Especially in hemarthrosis there is a need for specific diagnosis and for exclusion of internal derangement of the knee that may demand operation. We have evaluated the usefulness of arthroscopy and the compatibility between the clinical examination and arthroscopic findings in traumatic disorders of the knee in children.

Patients and methods

From 1985 through 1991 arthroscopy was performed for acute knee trauma in 76 boys and 62 girls at our hospital. The indications for the arthroscopy of the knee were an acute hemarthrosis with or without a displaced intra-articular osteochondral fragment, ligamentous instability and dislocation of the patella (Table 1). For hemarthrosis, arthroscopy was performed within 24 hours of the initial trauma and in the other cases within 6 days. The mean age was 13 (1–15) years. During the operation a special form was filled, for each case recording history, ligament status tested under anesthesia (the Lachman test, the anterior drawer test, the pivot shift test and the medial and lateral collateral stability tests), radiographic and arthroscopic findings and operation. In the majority the arthroscopy was performed under a general anesthesia, using a tourniquet, and the remaining under spinal or epidural anesthesia. After the operation, each child was followed up until the knee was symptom-free or no other operation was needed. The mean follow-up time was 6 months. The usefulness of the arthroscopy was estimated by comparing the clinical diagnosis with the final arthroscopic or operative diagnosis.

Results

In 98 of our 138 cases there was acute hemarthrosis of the knee (54 boys and 44 girls), accounting for 71 percent of the acute trauma cases (Table 2). The compatibility between clinical and arthroscopic diagnoses was 44 percent in preadolescent (< 12 years) and 67 per-

Table 1. Distribution of age and hemarthrosis (n 138)

Age	No. of patients	No. with hemarthrosis
1	1	0
6	3	1
8	3	2
9	6	5
10	14	9
11	15	13
12	22	18
13	21	14
14	27	18
15	26	18

Table 2. Arthroscopic diagnosis in acute hemarthrosis (n 98)

Diagnosis	No. of patients
Patellar dislocation	44
Ligament rupture	
Anterior cruciate	13
Posterior cruciate	7
Medial collateral	1
Osteochondral fracture	
Femoral	5
Patellar	4
Meniscal rupture	
Medial	4
Lateral	1
Synovial tear	4
Chondromalacia	1
Loose body	1
No specific diagnosis	13

cent in adolescents (> 12 years), in all 59 percent (Tables 3 and 4). In cases of ligament injuries alone, the compatibility decreased to 31 percent. Ligament injuries were found in 32 cases and concurrent injuries in 8 of those.

Patellar articulation

In all 48 cases of dislocation of the patella, an arthroscopy was performed before the final extra-articular operation. The typical arthroscopic finding was medial and sometimes lateral hematoma of the synovium, and in many cases the synovium was also ruptured. In 5 cases an osteochondral fragment was seen radiographically before arthroscopy. 14 additional displaced osteochondral fragments were found at arthroscopy.

Discussion

There are several reports on arthroscopy performed in children, but only a few dealing with acute trauma. The compatibility between the clinical diagnosis and the arthroscopic findings in younger children has varied from 18 to 70 percent (Morrissy et al. 1982, Ziv and Carroll 1982, Suman et al. 1984, Juhl and Boe 1986, Eiskjaer and Larsen 1987, Harvell et al. 1989, Hope 1991), improving in older children (Suman et al. 1984), like in our study. Ligamentous tears were previously thought to be less common in children (Saddowi and Hoffman 1970, Noyes at al. 1980), but Bergström et al. (1984) found a complete or partial rupture of the anterior cruciate ligament in 43 percent of cases with hemarthrosis, Eiskjaer and Larsen (1987) in 36 percent, and in our study 24 percent of cases, patellar dislocations excluded.

The compatibility between the clinical examination and the arthroscopic findings is fairly low in the case of ligament ruptures, 31 percent here, and consequently arthroscopy is of great value in order to obtain the correct diagnosis. Our results suggest that the true diagnosis would have been missed in over half of

Table 3. Comparison of pre- and postarthroscopic diagnoses in preadolescents (< 12 years)

Prearthroscopic diagnosis	n	Postarthroscopic diagnosis	n
No specific diagnosis	22	No specific diagnosis	7
		Patellar dislocation	2
		Ruptured medial meniscus	2
		Ruptured collateral ligament	5
		Ruptured collateral ligament + medial meniscus	1
		Ruptured cricuate ligament	2
		Osteochondral fracture femur	1
		Osteochondral fracture patella	1
		Synovial tear	1
Patellar dislocation	10	Patellar dislocation	7
		Ruptured cruciate ligament	1
		Ruptured collateral ligament	1
		Normal	1
Ruptured meniscus	4	Ruptured meniscus	1
		Synovial plicae syndrom	1
		Normal	2
Ruptured cruciate ligament	5	Ruptured cruciate ligament	2
		Ruptured cruciate and collateral ligaments	2
		Distorsion	1
Ruptured collateral ligament	2	Ruptured collateral ligament	2
Osteochondritis dissecans	1	Normal	1
Loose body	1	Loose body	1

No specific diagnosis – stable knee with hemarthrosis

Table 4. Comparison of pre- and postarthroscopic diagnoses in adolescents (> 12 years)

Prearthroscopic diagnosis	n	Postarthroscopic diagnosis	n
No specific diagnosis	38	No specific diagnosis	16
		Patellar dislocation	7
		Ruptured collateral ligament	3
		Ruptured cruciate ligament and meniscus	2
		Ruptured cruciate and collateral ligaments	1
		Ruptured cruciate ligament	1
		Osteochondral fracture	5
		Chondromalacia	2
		Synovial tear	1
Patellar dislocation	32	Patellar dislocation	32
Meniscal rupture	15	Meniscal rupture	5
		Collateral ligament and meniscal rupture	2
		Ruptured cruciate ligament	1
		Synovial tear	1
		Distorsion	6
Ruptured cruciate ligament	5	Ruptured cruciate ligament	5
Osteochondral fracture	2	Osteochondral fracture	2
Osteochondritis dissecans	1	Osteochondritis dissecans	2

those without a specific diagnosis, if arthroscopy had not been performed.

Furthermore, we feel arthroscopy should be performed in every case of acute dislocation of the patella as most osteochondral fragments were missed radiographically. However, MRI may well reduce the need for arthroscopy as a diagnostic tool in cases with acute knee trauma. Our results lead us to conclude that arthroscopy still has an important role in the diagnosis of the acute traumatic knee in children and adolescents, especially in the cases with hemarthrosis, ligamentous injury, and dislocation of the patella.

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