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DIFFERENT TECHNIQUES FOR DIAGNOSTIC ARTHROSCOPY

A Randomized Comparative Study

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A randomized comparison between the anterolateral approach and the Needlescope technique for knee joint arthroscopy in 121 consecutive patients is presented. The central approach was used as a reference, and the results of the other two techniques were compared with the results of this technique in the same patient. It is shown that the Needlescope necessitates a multiple puncture technique to give reliable information. When so used the results were comparable with those obtained with Storz arthroscopes and the central approach. On the other hand, the anterolateral approach gave less accurate results, mainly because of the difficulties encountered in examining the posterior compartments.

Key words: arthroscopy; diagnostic methods; knee injuries

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During the past 10 years arthroscopy has become a widely used diagnostic procedure. Since Watanabe presented his method in 1968 (Watanabe et al. 1968) new instruments and techniques have been introduced, but the anterolateral approach still seems to be the most commonly used (O'Connor 1977, Eikelaar 1975, Jackson & Dandy 1976, Henche 1978). In 1974 Johnson presented the Needlescope, a less traumatic instrument which calls for a special technique. In 1976 we reported our experiences with the "central approach" using Storz telescopes (Gillquist & Hagberg 1976). Recently Whipple & Bassett (1978) have described 10 different approaches to the knee joint in order to visualize the whole joint; the central approach was not one of them.

Our aim has been to minimize both the number of entries into the joint and the blind areas, and we have found the central approach optimal. The technique involves introducing the 5 mm arthroscope in the midline about 1 cm above the tibial plateau with the knee in 90° flexion. This enables the investigator to pass the arthroscope between the femoral condyles and the cruciates to examine the posteromedial and posterolateral compartments. All other compartments are also readily examined (Gillquist et al. 1979). The anterolateral approach as recommended by Watanabe et al. (1968) and the Needlescope technique (Johnson 1977) may have certain merits, however, and we felt that a comparison between these different approaches was needed. The present paper describes a randomized series in which the different approaches were compared in the same patient.

MATERIAL AND METHODS

The patients were admitted to hospital for knee disorders with or without a history of trauma. The report is based on 121 consecutive patients (90 men and 31 women) presenting during a period of 4 months. Of the 121 arthroscopies 68 were performed with Storz in-

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struments and the anterolateral approach and 53 with the Needlescope. Only two patients (one in each group) were examined during the acute stage with haemarthrosis. As the series was intended to compare different methods of *diagnostic* arthroscopy, patients in whom closed operation was planned were excluded.

General or epidural anaesthesia was used, and two diagnostic arthroscopies were done at the same session. The method for the first arthroscopy in any particular patient was randomly chosen according to a paper in a sealed envelope, either the Storz arthroscope (anterolateral approach) or the Needlescope (Dyonics Inc) being chosen. The second arthroscopy was always done with a Storz arthroscope with a 30°- and 70°-angled telescope and the central approach (Gillquist & Hagberg 1976). The method being tested was thus always compared with our standard procedure in each patient. Before running this series we used the anterolateral approach in about 100 patients and had been practising with the Needlescope in 50 patients. We have used the central approach in more than 1500 arthroscopies, however, and our accuracy with this method has been 90–98 per cent (Gillquist et al. 1979). We therefore decided to use the central approach as a reference. With all methods we tried to obtain as much information as possible from the first point of entry.

Diagnostic findings were classified as *correct* where there was full conformity with the findings using the central approach; as *incorrect* when they differed from those using the central approach; and *incomplete* when the structure in question could not be identified.

RESULTS

A technical failure with the Needlescope occurred in two consecutive patients. In the first we were able to complete the examination, but in the second we were forced to use the central approach as no information could be obtained with the Needlescope. The fault consisted of black spots in the field. Between the two examinations the number of black spots increased, making observation impossible. The remainder of the series was completed with another Needlescope.

The number of patients examined with the Needlescope was thus 52. No technical failures occurred with the Storz instruments. In 29 patients arthrotomy was performed as indicated by the history and the findings during arthroscopy; it was possible to confirm the arthroscopic findings, which were correct in all cases.

Diagnostic findings

In 8 knees no abnormal findings were noted even by the central approach (7 per cent); 3 were in the Needlescope group and 5 in the anterolateral approach group. The findings were abnormal in 113 knees.

The pathological findings are listed in Table 1. Lesions involving the patella were commonest. Almost two-thirds of the patients showed lesions affecting the patello-femoral joint, not always accompanied by symptoms. Next commonest were long-standing derangements of the posteromedial capsule, the posteromedial ligaments, and the attachment of the posterior horn of the medial meniscus. Rupture or pathological folding of the medial meniscus was found in 50 cases, and one-third of all patients had a chronic tear of the anterior cruciate ligament. One of the two patients with synovitis as a sole finding had pigmented villonodular synovitis, confirmed by biopsy.

Diagnostic findings using the Needlescope

The results are presented in Table 2. Our examination of the posteromedial compartment was deficient, as we did not use the posteromedial approach routinely, and only 8 of the 20 de-

Table 1. Pathological findings in 121 knees examined by arthroscopy using different techniques. There were often several lesions in the same knee

Abnormal findings	No. of cases
Patellar subluxation and/or chondromalacia	74
Medial shelf (pathological)	7
Medial meniscus, tear,	25
abnormal folding	35
Lateral meniscus, tear	15
Posteromedial ligaments, tear	61
Posterolateral ligaments, tear	4
Anterior cruciate, tear	38
Posterior cruciate, tear	9
Osteoarthrosis	20
Other	4

Table 2. Diagnostic findings with the Storz arthroscope and the anterolateral approach in 68 patients, compared with the findings using the central approach ('correct' column), and in 52 cases examined with the Needlescope compared with the central approach ('correct' column). Numbers of 'incorrect' and 'incomplete' examinations are given for each structure

	anterolateral $n = 68$		Needlescope $n = 52$	
Anatomic structure	incorrect/ incomplete	correct	correct	incorrect/ incomplete
Patella	9/1	58	26	18/8
Anterior cruciate	–/1	67	50	–/2
Posterior cruciate	–/46	22	28	4/20
Medial meniscus	2/3	63	41	10/1
Lateral meniscus	–/8	60	46	2/4
Posteromedial compartment	1/39	28	22	1/29

rangements in the posteromedial compartment were correctly diagnosed. The same explanation is probably valid for the many incomplete examinations of the posterior cruciate ligament. Four of the six ruptured posterior cruciate ligaments in this group were wrongly interpreted. Only 28 of the 52 posterior cruciate ligaments were correctly diagnosed. This contrasts with the anterior cruciate where the diagnosis was correct in all but two cases, one of which showed acute injury with haemarthrosis and the other a severe osteoarthrosis severely restricting the manoeuvrability of the instrument.

The medial and lateral menisci were correctly examined in 41 out of 52 and 46 out of 52 patients, respectively. Four out of 12 torn medial menisci and 2 out of 8 torn lateral menisci were wrongly diagnosed. The examination of the medial or lateral meniscus was incomplete in 5 out of 52 cases. The patello-femoral joint was misinterpreted in 18 cases and incompletely examined in 8; in none of these cases was the superior approach used.

Diagnostic findings with Storz and the anterolateral approach (Table 2)

The most striking problem with this approach was the difficulty in entering the posteromedial and/or posterolateral compartments. The posteromedial compartment was incompletely examined in 39 out of 68 cases. This also means that the inferior half of the posterior cruciate ligament was insufficiently examined in these cases. The anterior part of the posterior cruciate was also incompletely examined in 6 cases. Nevertheless, all three torn posterior cruciates in this group were diagnosed correctly. The anterior cruciate is less difficult to examine, and all tears were detected. The lateral meniscus was incompletely examined in 8 cases. Examination of the medial meniscus was easier, but the posterior horn could only be fully examined when it was possible to enter the posteromedial compartment. Patella lesions were overlooked in 9 knees, although incomplete examination was made in only one case.

Diagnostic results with the central approach

The diagnosis obtained with the central approach was confirmed in all patients subjected to arthrotomy.

The central approach gave additional information in 43 out of 52 knees primarily examined with the Needlescope and in 51 out of 68 examined by the anterolateral approach.

DISCUSSION

The central approach, in our hands, has proved highly reliable for diagnostic arthroscopy over a period of 9 years (Gillquist & Hagberg 1976, Gillquist et al. 1979, Gillquist & Hagberg 1978), and we have therefore used it as reference in the

present study. We have used the central approach for long enough to have acquired considerable skill with it, but we have far less experience with the anterolateral approach and the Needlescope. The anterolateral approach is probably as reliable in our hands as in those of most others, as we started doing arthroscopy using this approach in 1971 employing Storz instruments, which were also used for the central approach. We feel therefore that this comparison between the anterolateral and the central approaches is valid. The Needlescope has a smaller field of vision than the Storz telescopes, necessitating a multiple puncture technique (Johnson 1977), which we did not employ from the start. The Needlescope results thus stress the importance of adhering to the appropriate technique if a complete diagnosis is wanted. To see the whole joint it is important to use all five punctures described by Johnson (1977). Used correctly, the Needlescope proved as reliable as the Storz instruments and the central approach. If it is desired to reduce the number of punctures the Needlescope may be used as directed by the clinical signs, but only part of the joint will be seen. Diagnosis of injury to the posteromedial capsule and ligament complex is not possible with the Needlescope technique. We also feel that the diagnosis of a tear of the posterior cruciate ligament can be more reliably made with the central approach than with the Needlescope. A posteromedial puncture will not always show the posterior cruciate, whereas this structure can be seen in every instance using the central approach (Gillquist et al. 1979).

An attractive feature of the Needlescope is its smallness, making the examination less traumatic. The instrument is therefore particularly suitable for examining outpatients under local anaesthesia, which cuts costs.

On the other hand, the anterolateral approach seems to offer no advantages over the central. It was more difficult to enter the posteromedial and posterolateral compartments from the anterolateral insertion. When using a wide-bore endoscope, the examination of the posterior compartments is very important, if high diagnostic accuracy is to be obtained, especially with regard to the medial meniscus and the posterior cruciate. We also encountered difficulties when examining the lateral compartment and the patella. Subluxation of the patella was more easily assessed from the central approach.

Our conclusion is that the central approach gives optimum access to the knee joint from a single point of entry. The Needlescope technique gives similar results via several points of insertion.

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