Techniques in Medicine

Arthroscopy of the Knee Joint

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British Medical Journal, 1973, 3, 285-286

Summary

Review of the results of arthroscopy of the knee joint in a consecutive series of 112 patients showed that in 81 knees the preoperative diagnosis was confirmed, and in 24 it was found to be incorrect. In seven knees the procedure yielded no further information owing to poor visualization within the joint. Arthroscopy provides a useful means of achieving more accurate diagnosis in patients with internal derangements of the knee.

Introduction

Endoscopy has been established for many years as a valuable diagnostic aid in the management of the surgical patient. However, the application of the technique to the study of the interior of joints has been slow to develop and has mainly been confined to examination of the knee. The frequent mechanical disorders to which this joint is subject, the often inadequate view of its interior obtained at arthrotomy, and its accessible position, render the knee particularly suitable for endoscopic examination.

The earliest attempts made to examine the interior of joints were those carried out on cadavers by Tagaki in 1918.¹ Further studies were undertaken by Bircher² and Kreuscher³ both of whom used gas to distend the joint cavity. Burman *et al.*⁴ reported on 30 patients in whom they had carried out arthroscopy of the knee joint. They concluded that the procedure was not only safe but had the advantages of diagnostic arthrotomy without necessitating operation. In spite of their optimistic report, however, interest declined, though in Tokyo attempts to develop a more satisfactory instrument continued. In 1960 Watanabe and Takeda⁵ described the Watanabe No. 21 arthroscope and stimulated further interest in the procedure among workers outside Japan. This instrument was used to examine the joints reported in this series.

The results of 112 consecutive arthroscopies of the knee joint are presented and the value of the procedure in the management of internal derangements of the knee is analysed.

Technique

Arthroscopy is carried out using full aseptic technique in a darkened operating theatre. General anaesthesia is preferred to allow full relaxation of the joint and thus make manipula-

tion of the arthroscope easier. A tourniquet may be used on occasions if bleeding is troublesome. A large-bore needle is inserted into the suprapatellar pouch from the lateral side and the joint is distended with 50-100 ml of saline. The knee is then flexed to 45° and a small stab incision is made in the skin just lateral to the patellar tendon on the joint line. The trocar and sheath of the arthroscope are pushed through the joint capsule. A blunt obturator then replaces the trocar to allow manipulation of the instrument within the joint without damaging articular cartilage. The light carrier and telescope are assembled in the sheath, and continuous irrigation with saline is started through the joint. The wide-bore needle previously inserted in the suprapatellar pouch acts as a drain for the irrigating fluid.

The anterolateral approach described allows good visualization of all joint compartments and is convenient for the manipulation of the instrument. Other sites may be used in particular circumstances.

If surgery is indicated operation is carried out under the same anaesthetic after the limb has been prepared and towelled again. If surgery is not indicated the small stab incision is closed with one suture and a wool and crêpe bandage is applied to the knee. The patient can walk on recovery from the anaesthetic and is discharged within 48 hours. Discomfort is slight and relieved by mild analgesics.

Results

Altogether, 112 knees were examined, 87 in men and 25 in women.

The commonest internal derangement found was a torn meniscus (58 knees). There were 14 cases of chondromalacia patellae, and six where the anterior cruciate ligament was found to be ruptured. Synovitis was present in five joints. Three knees were osteoarthrotic. Three joints were found to contain loose bodies, one secondary to osteoarthrosis and two to osteochondritis dissecans.

After arthroscopy 16 knees were considered to be normal from the point of view of the structures within the joint. However, a number of these showed dynamic abnormalities such as rotational instability of subluxation of the patella and could not be regarded as normal in the full sense of the word. In these 16 knees the diagnosis before arthroscopy was meniscus lesion in eight cases, subluxation of the patella in five, and chondromalacia patellae, a loose body, and "female adolescent problem knee" in three others. The arthroscopic findings enabled the surgeon to carry out corrective extra-articular procedures knowing that there was no additional intra-articular abnormality present.

In 81 knees the preoperative diagnosis was confirmed by arthroscopy. Synovial biopsy was carried out in five knees in this group in addition to visual assessment.

In 24 knees the preoperative diagnosis was found to be incorrect at arthroscopy. In 15 patients the subsequent

operation was altered because of the findings; in nine others unnecessary surgery was prevented.

In seven knees arthroscopy was found to be of no value. In these patients the view of the interior of the joint was inadequate for proper assessment, and in one of the earlier ones to be examined in this series a false positive diagnosis led to the removal of a normal meniscus.

Discussion

The results show that in about a quarter of the patients in this series the nature of the operation was changed or unnecessary surgery was prevented as a result of the information obtained by arthroscopy. The incidence of negative meniscectomy was less than 1%. In seven knees, however, visualization of the joint was poor and the procedure contributed nothing towards the management of the patient.

The usual reasons for failing to obtain an adequate view are a particularly tight knee, an intact septum dividing the medial from the lateral compartment, a large infrapatellar fat pad, or prominent synovial folds. As experience in the use of the instrument is gained these difficulties become less noticeable. Most of the cases where a poor view was obtained occurred early in the series before skill in manipulating the instrument had been achieved.

No complications were recorded as a result of arthroscopy in this series. In particular there were no cases of infection. This finding is in agreement with that of other workers who have recently reported large series.⁶⁻⁸ There were no cases of infection in the 1934 series reported by Burman *et al.*⁴ The risk of damage to the articular cartilage of the femoral condyles may be obviated by use of the blunt obturator after the trocar has been used to penetrate the joint capsule.

Arthroscopy enables direct observation to be made of the intra-articular structures without subjecting the patient to arthrotomy. Moreover assessment of all joint compartments is more easily and exactly carried out at arthroscopy than it is at arthrotomy. The suprapatellar pouch, the patellofemoral articulation, the lateral tibiofemoral compartment, the medial tibiofemoral compartment, and the intercondylar area can be clearly seen using the lateral approach described previously. The procedure is of particular value in the management of meniscal injuries. The posterior horns of the menisci are often not seen at arthrotomy. However, they can be viewed through the arthroscope thus enabling the surgeon to assess the condition of the whole meniscus rather than just the anterior two-thirds. In this series there were seven patients

in whom at arthroscopy a tear was found of the meniscus opposite to that which had been previously diagnosed as abnormal on clinical grounds. It is probable that a number of these patients would have had a normal meniscus removed had the diagnosis not been changed in the light of the arthroscopic findings. In addition to the menisci the anterior cruciate ligament is clearly seen, and the diagnosis of partial or complete tears can be confirmed. In patients with chondromalacia patellae the fibrillated cartilage is seen suspended from the under surface of the patella. The relation between the areas of abnormal articular cartilage on the patella and the femoral condyles can be viewed with the knee in various positions of flexion and extension.

In patients with synovitis information can be gained by visualization of the synovium in addition to biopsy. The condition of the articular cartilage in rheumatoid arthritis can be assessed, and this is of value in selecting patients for synovectomy. Synovial biopsy can be carried out on selected areas of the synovium offering a considerable advantage over blind needle biopsy. With experience the synovial changes occurring in different conditions such as rheumatoid arthritis, osteoarthritis, and villonodular synovitis can be distinguished, and photography enables accurate records to be kept of the operation findings.

Arthroscopy should not be regarded as a short cut to diagnosis. As with all endoscopic techniques, a little time is required in the early stages to acquire skill in the use of the instrument. Once experience has been gained the procedure adds about 20 minutes to the operation time, and provides a valuable means of achieving more accurate diagnosis in the management of internal disorders of the knee.

My thanks are due to Mr. Adrian Henry for his encouragement in the preparation of this paper and for allowing me to study the patients under his care.

References

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Any Questions?

We publish below a selection of questions and answers of general interest

Engelmann's Disease

What is Engelmann's disease? What is the treatment for it, and is thyrocalcitonin—effective in Paget's disease—likely to be of help?

Engelmann's disease is a very rare disorder. It was first described by F. Engelmann in 1929 and since then there have been fewer than thirty similar cases reported in the literature.^{1,2} Familial and hereditary tendencies have not been described with certainty. The patient has a malnourished appearance and shows progressive expansion of the cortex of bones, specially the long bones. It usually starts in childhood but may first become clinically manifest at a later age. The pre-

senting symptoms are usually muscular weakness with gait abnormalities, and bone pain is common. Involvement of the skull may cause increased intracranial pressure, proptosis, and blindness, and involvement of the petrous temporals may cause deafness. Puberty is frequently delayed. The condition can be asymptomatic and skeletal changes seen on x-ray may be the only evidence of the disease. The disease is usually progressive but long term follow-ups are scanty in the literature.

The radiological changes consist mainly of a symmetrical, dense, fusiform expansion of the cortex of the diaphyses of the long bones, tending to obliterate the medullary cavity. In advanced cases, most of the bones may become involved and the epiphyses as well. Biochemical changes are not charac-