

Occasional Survey

Arthroscopic surgery of the knee

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Abstract

In the first 1000 arthroscopic operations performed by one surgeon 136 patients had two or more procedures, making a total of 1168 during the 1000 operations. The indications for operation were internal mechanical derangements in 565 patients, anterior knee pain in 246, disorders of the synovium in 77, ligament injuries in 63, and degenerative joint disease in 49. Complications included fracture of instruments in the knee in five patients, haemarthrosis in 10, deep vein thrombosis in three, and synovial fistula in one. In no patient was the wound infected. A total of 26 different operations was performed.

Introduction

Arthroscopic surgery is now widely recognised as a useful technique and is the standard of care in some centres, but it has yet to be accepted universally and is sometimes viewed with suspicion as an innovation of dubious value. We set out the general experience of the first 1000 arthroscopic operations performed by one surgeon with reference to the nature of the operations performed, the indications for operation, practical difficulties encountered, the benefits for the patient, and the complications.

Patients and methods

During 58 months, 1000 consecutive arthroscopic operations were performed. In the same period 393 purely diagnostic arthroscopies, with or without the use of an intra-articular probe, were performed but were not included in the study. Two lesions were found and treated in 115 patients and three or more in 21, making a total of 1168 procedures. If the operation included two or more procedures the procedure most relevant to the patient's principle symptoms was designated the primary procedure and the others secondary procedures. A total of 26 different procedures was performed.

The indication for operation was used to divide the operations into five groups: mechanical derangements 565, anterior knee pain 246, synovial disorders 77, ligament injuries 63, and degenerative joint disease 49.

TECHNIQUE

The standard operating technique used a 5 mm 30° fore-oblique arthroscope with operating instruments inserted through a second channel. The operations were all performed under general anaesthesia with a pneumatic tourniquet applied to the thigh and inflated without exsanguination. The triple puncture technique in which two instruments were inserted through separate incisions with the arthroscope through a third was also used. The operating arthroscope and powered instruments were also required for certain procedures. The standard insertion of the arthroscope was the anterolateral approach but the central, anteromedial, lateral suprapatellar, lateral mid-patellar, and posteromedial approaches were used when appropriate. The different instruments, techniques, and approaches were all useful and complemented each other.

CLASSIFICATION OF PROCEDURES

Operations on menisci

If a meniscus was found to be torn with the creation of a mobile meniscal segment likely to cause symptoms, the mobile fragment was removed with the aim of leaving the largest possible rim of intact and stable meniscal tissue; such procedures were classified as partial or subtotal meniscectomies according to the amount of meniscus removed. If a small meniscal tear was found unexpectedly in such a position that it could extend to create a large meniscal fragment—for example, a small radial tear on the free margin of the lateral meniscus—the damaged area of meniscus was excised to leave as much normal meniscal tissue as possible; these procedures were classified as trimming of a minor meniscal tear. If small flaps or tags of degenerate meniscal tissue were found in a knee affected by widespread degenerative change, all loose fragments of meniscal tissue were removed and the procedure classified as trimming of a degenerate meniscus, unless the mobile fragment of meniscus was large enough to be the principle cause of symptoms, when it was classed as a meniscal tear. In knees that had undergone a previous meniscectomy tears found in the remaining meniscal rim or the fibrous rim that formed in the place of the meniscus were treated by excision of the loose fragment and classified as debridement of a postmeniscectomy rim.

Loose bodies and foreign bodies

Mobile fragments in the knee were classified as loose bodies only if they measured more than 1 cm in any direction and were considered as "loose" even if they were attached to the synovium or the bed from which they arose, provided that they retained some mobility and were likely to be a cause of symptoms. Both transradiant and radio-opaque bodies were included. The removal of fragments of surgical instruments broken in the knee at the time of operation were not classified as removal of foreign bodies, for which the foreign body had to be the indication for operation.

Lesions of bone and articular cartilage

Lesions of the articular cartilage consisting of a flap of articular cartilage extending only part of the way through the articular surface

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were classified as chondral flaps and removed. If an area of articular cartilage had separated completely from its bed to leave exposed cortical bone drill holes were made into cancellous bone through the base of the lesion. Loose margins of articular cartilage around the edges of such lesions were regarded as chondral flaps. Areas of softened or fibrillated cartilage on the patella consistent with the appearances of chondromalacia patellae were shaved smooth with powered shavers or hand instruments. Levelling of degenerate articular cartilage was classified as shaving of degenerate articular cartilage to distinguish the procedure from the shaving of chondromalacia patellae and the trimming of chondral flaps.

In one patient an area of abnormal ossification disrupted the articular surface and a sample of the lesion was removed through the articular cartilage defect for histological study.

Operations on synovium

Synovial biopsy was performed more often as a secondary than a primary procedure. Partial synovectomy was performed using a powered instrument. The operation was classed as a synovectomy if the aim of operation was to reduce the bulk of synovial tissue rather than to obtain a specimen for histological study. The division of intra-articular adhesions included both the division of isolated bands and the release of dense fibrous ankylosis in the suprapatellar pouch. Pedunculated subsynovial lipomas were found and removed, and were distinguished from lesions of the fatpad by their size and site. Included with lesions of the fatpad were miscellaneous conditions of the anterior half of the intercondylar notch such as ganglia and hypertrophic synovial tags.

The medial synovial shelf was distinguished from the medial suprapatellar plica, and the indications for excision or division of these structures are described elsewhere.¹ Lateral release of the extensor mechanism was performed for recurrent subluxation or dislocation of the patella, chondromalacia, and lateral tracking of the patella with pain localised to the lateral half of the patella.

Operations on ligaments

Redundant stubs of anterior and posterior cruciate ligaments were excised if repair was considered impossible and if it was thought likely that the stub was long enough or swollen enough to be the cause of symptoms. In one patient a block of bone avulsed from the tibia by the anterior cruciate ligament failed to unite to its bed and was removed. Carbon fibre ligament prostheses were inserted under arthroscopic control as an adjunct to a MacIntosh tenodesis procedure for anterior cruciate disruption.²

Results

OPERATIONS FOR MECHANICAL DERANGEMENT (table I)

Five hundred and sixty-five operations were performed for internal mechanical derangement, but when secondary procedures were included a total of 622 procedures had been performed for mechanical derangement. Nine of the 475 patients (1.9%) undergoing arthroscopic meniscectomy required a second arthroscopic procedure during the period of study, and one patient later had an open total meniscectomy for cystic degeneration of the lateral meniscus.

Removal of loose bodies often proved unexpectedly difficult. Loose bodies were encountered that had not been visible radiologically, the loose bodies often fractured while being withdrawn from the knee, and in two patients a second unsuspected loose body was retained and had to be removed at a second procedure. Two foreign bodies, a fragment of glass and a broken needle, were removed arthroscopically.

OPERATIONS FOR ANTERIOR KNEE PAIN (table II)

The medial synovial shelf was often excised in the earlier part of the study but the indications for its excision later became more stringent. Arthroscopic lateral release proved more traumatic than other arthroscopic operations and was accompanied by bleeding in the line of capsular incision, and in one patient an open procedure to arrest haemorrhage was needed.

The medial suprapatellar plica was divided in 30 patients, but the

indications for this procedure became narrower as the study progressed and are now confined to the division of a complete or almost complete suprapatellar membrane.

OPERATIONS FOR SYNOVIAL DISORDERS (table III)

Arthroscopic synovectomy was performed with a powered shaver but pituitary rongeurs and a small uterine curette were used to remove exuberant synovial tissue from tight corners of the knee. One synovial biopsy was repeated, and one patient in whom adhesions in the suprapatellar pouch were divided underwent a second procedure to divide the remaining adhesions.

TABLE I—Number (%) of operations for mechanical derangements (including secondary procedures)

Partial or total meniscectomy	475 (76.4%)
Loose body	63 (10.1%)
Chondral flap fracture	33 (5.3%)
Minor meniscal lesion	23 (3.7%)
Drilling	25 (4.0%)
Foreign body	1 (0.3%)
Bone biopsy	1 (0.2%)
	622

TABLE II—Number (%) of operations for anterior knee pain (including secondary procedures)

Synovial shelf excision	131 (39.2%)
Lateral release	91 (27.2%)
Suprapatella plica	30 (9.0%)
Patellar shave	28 (8.4%)
Fatpad etc	31 (9.3%)
	334

TABLE III—Number (%) of operations for synovial disorders (including secondary procedures)

Synovial biopsy	66 (64.7%)
Adhesions	28 (27.5%)
Synovectomy	5 (4.9%)
Lipoma	3 (2.9%)
	102

TABLE IV—Number (%) of operations for ligament lesions (including secondary procedures)

Anterior cruciate stub	42 (60.0%)
Ligament substitution	23 (32.8%)
Posterior cruciate stub	5 (5.7%)
Avulsed tibial insertion	1 (1.4%)
	70

OPERATIONS FOR LIGAMENT INJURIES (table IV)

Arthroscopic carbon fibre ligament substitutes were inserted in 23 patients. Two patients developed an infected sinus over the site of insertion of the carbon fibre at four and six months after operation respectively. The wounds healed after thorough curettage of the sinuses.

The stub of the anterior cruciate ligament was excised in 42 patients.³

OPERATIONS FOR DEGENERATIVE JOINT DISEASE

Including secondary procedures, 60 operations were performed for degenerative joint disease. Degenerate menisci were trimmed in 35

patients (58.3%) to leave as even a meniscal rim as possible. Fourteen patients (23.3%) underwent debridement of a postmeniscectomy rim. Areas of loose or irregular articular cartilage were shaved or levelled in 11 patients (18.3%). Areas of exposed subchondral bone less than 1 cm in diameter were regarded as mechanical derangements and their bases drilled.

COMPLICATIONS

In five patients instruments fractured in the knee during operation. One patient required an arthrotomy to remove the fragment, and in another the fragment escaped down the synovial sleeve surrounding the posterior cruciate ligament and could not be removed. Ten patients had a haemarthrosis requiring operation and three deep vein thrombosis. One patient had a synovial fistula that healed after immobilisation in plaster for one week. There were no wound infections, pulmonary emboli, or other complications.

DURATION OF OPERATION

During the learning stages, operations were protracted but became shorter with experience. The operating time for arthroscopic meniscectomy fell from 43 minutes (range 10-90) for the first 30 patients to 17 minutes (range 5-50) for the final group of 30 patients.

Discussion

The principle advantage of arthroscopic surgery is reduced surgical trauma and a consequent shortening of inpatient stay and rehabilitation. In general, patients are able to return to work within two weeks if engaged in heavy occupations and one week if in light occupations, but the results may vary according to the nature of the operation.³⁻⁵ Less obvious advantages include more accurate diagnosis than was previously possible, more precise surgery, and a clearer insight into disorders of the knee. This series includes the first patients operated on while

experience was being gained. The predominance of patients undergoing operation for torn menisci, loose bodies, and anterior knee pain, with a smaller proportion undergoing operations for reconstruction of a ligament and degenerative joint disease, reflects the fact that there are fewer arthroscopic operations for disruption of a ligament and degenerative joint disease than for internal derangements. More operations were performed for osteoarthritis, including debridement of osteophytes and drilling of extensive articular cartilage defects in the later part of the study, and this trend has continued since the study was completed. Despite these developments, arthroscopic surgery still has less to offer for degenerative joint disease and injuries to a ligament than for other conditions.

The experience of the first 1000 cases suggests that arthroscopy is safe and reliable and can greatly benefit the patient. The operative techniques are difficult and require as much, if not more, scrupulous attention to detail as other types of orthopaedic surgery. Complete confidence in the use of an arthroscope from several approaches is essential.

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MATERIA NON MEDICA

Mount Kenya from the east

Mt Kenya's two highest peaks are only for the experienced ice and rock climber, but the third peak, Point Lenana, can be reached by any reasonably fit person. Even so it is higher than Mt Blanc. Most tourists climb from the west side, where there is a luxury lodge and a well-marked path. It takes two days.

There is another route, from the east side beginning at Chogoria Hospital. It takes four days. Five of us went up with a guide and porters. We set off at 1 pm, straight from outpatients. Around the hospital are coffee plantations and as we ascended we passed through tea plantations, dense tree forest, bamboo forest and then on to open moorland, where we spent the first night.

The second day was an airy ridge walk with the glacial Nithi Valley on our left. Our destination, Minto's Hut, was situated at the head of the valley surrounded by high peaks. The valley floor was dotted with giant groundsel and lobelia. These strange plants, taller than a man, are found only on the mountains of east Africa. At 14 000 ft some of us had headaches and nausea from the altitude. The cold also stopped us sleeping and we were up and walking in time to see a spectacular sunrise over a sea of clouds. We walked up long scree slopes and then traversed around the mountain to Top Hut. This is a base for real climbers, but walkers like us usually go straight on for Lenana up the edge of the Lewis Glacier. We then joined the tourist route and met the first other person we had seen on the mountain. Half an hour of struggle saw us on the top. The views were breathtaking and it is said that on a good day Mt Kilimanjaro is visible 250 miles away. We could not see it and the clouds quickly closed in and down we went. We would be back in time for work on Tuesday, but it will not be long before we are up again with another group of elective medical students.—JIM THORNTON, Chogoria Hospital, Kenya.

Spring break in Florida, 1982

The annual spring break—with bright sunshine, ambient temperatures about 25°C, plentiful oranges and grapefruit, and good company—offers pleasing prospects for thousands of students (and some of their professors) seeking respite from freezing weather and curricular demands in the northern USA and Canada. The third day of our holiday found us on Daytona Beach, the scene of successive attempts on the world land speed record by Sir Malcolm Campbell and others in the twenties and thirties. The beach is over 18 miles long and widens to about 500 feet of gently sloping firm sand at low tide. The association of Daytona with the automobile goes back to the early years of the century, when the nearby Ormond Beach Hotel included an outbuilding for "Chauffeurs' Barracks." There have been no races on the beach since 1958, and these have moved inland to the high-banked Daytona International Speedway; cars are still allowed on the beach but move at a sedate and closely observed limit of 10 mph.

On the morning of 23 March the traffic came to a stop, blasts of rock music from radios were muted, and even the most prostrate of sunbathers got to their feet. All eyes were directed down the beach. Suddenly we all saw with great clarity an intense patch of light, moving upwards with increasing speed and then leaving behind it a cloudlike trail as it arched away over the Atlantic before disappearing from view. Everyone on the beach seemed momentarily still and awestruck. "Who says there's no free launch?" cried a student, and we all laughed. Suddenly recollecting our own earth-bound status, we ran across the sand and plunged into the sea, which was quite warm. It was a memorable day. We had just witnessed the lift-off of the space shuttle from Cape Canaveral, 50 miles away.—JOHN HENDERSON, chest physician, Ottawa.