THE IMPACT OF ARTHROSCOPY ON THE MANAGEMENT
OF DISORDERS OF THE KNEE

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A study has been made of 800 consecutive arthroscopic examinations of the knee with special emphasis on
the changes in management that resulted. Of 614 knees that would have been operated upon if arthroscopy had
not been available, open operation was avoided in 32 per cent, a different operation was done or planned in
27 per cent, and there was no important change in the remaining 41 per cent. Of 186 knees that would have
been treated conservatively if arthroscopy had not been available, the examination resulted in some immediate
benefit to 30 per cent of the patients. There were no wound infections after arthroscopy alone, and the known
incidence of incorrect interpretation was 1.4 per cent.

Although the technique and reliability of arthroscopy of the knee are well established, less is known of the effect
of arthroscopy on the management of the patient. This paper sets out the changes in management that resulted
from arthroscopy, with special reference to the patients in whom open operation was avoided.

PATIENTS AND METHOD

Eight hundred consecutive arthroscopies done in 705 knees in 675 patients in the nine years’ period from 1965
to 1974 were reviewed. The diagnosis and the proposed management based on clinical and radiographic informa-
tion were recorded before arthroscopy, and compared with the diagnosis and management after arthroscopy. In 547
cases (68 per cent) the patients were referred specifically for arthroscopy by other orthopaedic surgeons (425) or
rheumatologists (three-two), or were cases of disputed compensation (ninety). The remaining 253 cases (32 per
cent) came from general practitioners (179) or from the emergency department (seventy-four), and were consid-
ered to represent a routine orthopaedic practice.

TECHNIQUE

The knees were examined in the usual way (Jackson and
Abe 1972; Jackson 1974) with the Watanabe Number 21
arthroscope. If arthroscopy was indicated it was generally
done under the same anaesthetic, but if no operation was
indicated the patients returned home later on the day of
arthroscopy or on the following morning.

CLASSIFICATION OF RESULTS

The patients were divided into two groups: 1) those who
would have undergone arthrotomy for diagnosis or treat-
ment if the arthroscope had not been available; and 2) those who would not have undergone arthrotomy be-
cause of insufficient clinical evidence. We have called the
second group of cases “diagnostic arthroscopies” because
they were done to exclude unlikely, but possible, intra-
articular disorders.

Those who would have undergone operation if arthro-
sCOPY had not been available were subdivided into 1) those in whom arthroscopy made no important difference
to management: 2) those in whom open operation was avoided; and 3) those in whom present or future manage-
ment was determined by the examination.

RESULTS

The overall effect of arthroscopy on management is set
out in Table I.

Patients who would have undergone arthrotomy if arthro-
sCOPY had not been available

No important difference in management (253 arthroscopy)
(Table II)—This group included those patients in whom
the diagnosis before operation was correct or, if incorrect,
in whom no difference in management resulted. For
example, if the diagnosis before operation was a torn
meniscus but a loose body was found, it was considered
that arthroscopy had not altered the management because
the correct diagnosis would have been found at
arthrotomy.

Exact knowledge of the pathology within the knee made
a smaller incision possible in sixty-seven (26 per cent) of
the patients. For example, a retained posterior horn
fragment could be removed through a single posterior
incision, or a loose body could be localised and removed
through a stab incision.

The diagnosis before operation was altered in forty
patients (16 per cent) and an additional diagnosis was
made in twenty (8 per cent). None of these changes,
however, constituted an important change in management.

Patients in whom open operation was avoided (196 arthro-
scopies) (Table III)—In 114 (58 per cent) of these patients
the diagnosis before arthroscopy could not be confirmed,
TABLE I

<table>
<thead>
<tr>
<th>Condition</th>
<th>Routine cases</th>
<th>Referred cases</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>614 knees that would have</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>undergone arthroscopy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No difference in management</td>
<td>102</td>
<td>151</td>
<td>253</td>
</tr>
<tr>
<td>Open operation avoided</td>
<td>55</td>
<td>141</td>
<td>196</td>
</tr>
<tr>
<td>Treatment modified</td>
<td>50</td>
<td>115</td>
<td>165</td>
</tr>
<tr>
<td>Total</td>
<td>207</td>
<td>407</td>
<td>614</td>
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</table>

186 diagnostic arthroscopies

<table>
<thead>
<tr>
<th>Condition</th>
<th>Routine cases</th>
<th>Referred cases</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No difference in management</td>
<td>28</td>
<td>103</td>
<td>131</td>
</tr>
<tr>
<td>Treatable condition found</td>
<td>14</td>
<td>20</td>
<td>42</td>
</tr>
<tr>
<td>Procedure done through arthroscope</td>
<td>4</td>
<td>9</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>46</td>
<td>140</td>
<td>186</td>
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TABLE II

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<th>Procedure</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Clinical diagnosis confirmed</td>
<td>60</td>
<td>66</td>
<td>126</td>
</tr>
<tr>
<td>Smaller incision used</td>
<td>16</td>
<td>51</td>
<td>67</td>
</tr>
<tr>
<td>Different diagnosis</td>
<td>16</td>
<td>24</td>
<td>40</td>
</tr>
<tr>
<td>Additional diagnosis</td>
<td>10</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>102</td>
<td>151</td>
<td>253</td>
</tr>
</tbody>
</table>

TABLE III

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Routine cases</th>
<th>Referred cases</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condition not amenable to operation</td>
<td>37</td>
<td>77</td>
<td>114</td>
</tr>
<tr>
<td>Exploratory arthrotomy avoided</td>
<td>13</td>
<td>49</td>
<td>62</td>
</tr>
<tr>
<td>Procedure done through arthroscope</td>
<td>5</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>55</td>
<td>141</td>
<td>196</td>
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</tbody>
</table>

TABLE IV

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Routine</th>
<th>Referred</th>
<th>Total cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Future strategy planned</td>
<td>24</td>
<td>81</td>
<td>105</td>
</tr>
<tr>
<td>Joint not opened</td>
<td>13</td>
<td>20</td>
<td>33</td>
</tr>
<tr>
<td>Different operation done</td>
<td>13</td>
<td>14</td>
<td>27</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>115</td>
<td>165</td>
</tr>
</tbody>
</table>

Of the ninety-two remaining patients, the symptoms had spontaneously improved in seventy-three, were no different in sixteen, and were worse in two. One patient developed florid psychiatric symptoms.

Of the 196 cases in which open operation was avoided, arthroscopy was done instead of exploratory arthrotomy in sixty-two (32 per cent). This group included many patients with persistent symptoms after meniscectomy in whom no condition treatable by open operation was found. For example, extensive but early degenerative change in the weight-bearing areas of the
femoral condyles was not considered suitable for treatment by an intra-articular surgical procedure.

In the remaining twenty patients (10 per cent) a procedure was done through the arthroscope that obviated open operation. These patients included six in whom a loose body was found and removed, and fourteen in whom synovial biopsy or partial meniscectomy was done through the arthroscope.

**Patients in whom treatment was modified as a result of arthroscopy** (165 arthroscopies) (Table IV)—In 105 (64 per cent) of these knees the strategy of future treatment was determined by arthroscopy. This group included patients in whom a high tibial weight-transference osteotomy was planned but who were found to have too much wear in the radiologically "normal" compartment of the joint for success to be likely. In such patients, operation was deferred until the symptoms merited prosthetic replacement.

In thirty-three cases (20 per cent) treatment would have entailed opening the joint if arthroscopy had not been available. This group included patients undergoing tibial osteotomy for degenerative arthritis who were at first thought to require arthrootomy for joint debridement or meniscectomy.

In twenty-seven other patients (16 per cent) a different diagnosis was made that resulted in a different operation being done, and in ten a lesion was found in the opposite meniscus to that originally considered deranged.

**Diagnostic arthroscopy** (186 arthroscopies, 23 per cent) (Table I)

Patients were placed in this category if it was considered that they were unlikely to be improved by operation and would therefore have been managed conservatively if arthroscopy had not been available. In 131 (70 per cent) of these cases, arthroscopy was unhelpful and confirmed the clinical impression. Although arthroscopy did not alter the eventual management of these patients it often enabled the surgeon to reassure the patient more firmly that no operation was needed. In the instance of professional athletes or other individuals in whom rapid definitive decisions had to be made with confidence, arthroscopy proved of special value.

In forty-two cases (23 per cent) a surgically treatable condition was found, which was of particular value if the patient had originally been thought to be a hysterical or a malingerer.

In thirteen other cases (7 per cent) a procedure was performed through the arthroscope or a biopsy taken that would not have been done if arthrootomy had been necessary.

**False interpretations**

There were five false positive interpretations, an incidence of 0·6 per cent. In all of these an arthrootomy would have been done if arthroscopy had not been available, and the error in interpretation was discovered at arthrootomy in three.

In one of the remaining two, a normal meniscus was removed; the patient's history was typical of a meniscal injury and the arthrograph was also incorrectly positive. In the other patient, a frayed meniscus was removed but no tear was found.

There were six false negative interpretations, an incidence of 0·8 per cent. In one patient the clinical evidence was considered so strong that arthrootomy was done immediately after arthroscopy and a peripheral meniscal tear was found. In three other patients, persistent symptoms led to further investigations and repeat arthroscopy revealed damaged meniscus, confirmed at meniscectomy. In one patient an exploratory arthrootomy was done and a small arteriovenous malformation found in the synovium of the suprapatellar pouch. In the last patient, synovium which was considered normal was later proved to have rheumatoid changes.

**Complications**

There were no infections after arthroscopy alone, but there were four superficial infections and one deep infection after 460 arthrotoomies, an incidence of 1·1 per cent. Two patients had transient infrapatellar anaesthesia after arthroscopy from the medial side. The bulb broke in one patient after an indication for arthrootomy had been established. The fragments were removed at arthrootomy. The light carrier bent in one patient, making removal of the arthroscope difficult, and in two patients a short circuit caused a tetanic quadriceps contracture without ill effect.

**CONCLUSION**

Arthroscopy of the knee has proved to be a reliable and highly accurate diagnostic technique with little morbidity and few complications. The information yielded can have a significant effect on the management of disorders of the knee. Although originally arthroscopy was considered to be most valuable in the study of knees that presented difficult diagnostic problems, its use resulted in an important difference in management in 51 per cent of the patients considered to represent a routine orthopaedic practice.

Its chief advantages were the identification of those patients in whom a proposed arthrootomy was unnecessary, and the more accurate planning of surgical strategy. In other patients arthroscopy did not alter the management, but allowed reassurance or a definite prognosis to be given with greater certainty than was otherwise possible.

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**REFERENCES**
