Arthroscopic Debridement for Grade III and IV Chondromalacia of the Knee in Patients Older Than 60 Years

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ABSTRACT: Arthroscopic debridement has been used to treat patients with degenerative knee osteoarthritis, although there is sometimes conflicting evidence documenting its efficacy. This study evaluates the success of arthroscopic debridement in elderly patients with grade III and IV chondromalacia of the knee as measured by patient satisfaction and the need for additional surgery. From December 1998 to August 2001, a total of 102 consecutive cases of knee arthroscopy in 99 patients >60 years were performed. Average follow-up was 34 months (range: 7-104 months). Patients were asked about their satisfaction using a visual analog scale, and the presence of meniscal lesions during arthroscopy and the treatment for these lesions were evaluated. Knees also were assessed for articular surface degeneration using Outerbridge’s classification for chondromalacia. The need for and type of additional surgery was evaluated. During arthroscopy, meniscal lesions requiring a partial meniscectomy were found in 95 knees. Chondromalacia was found in 92 knees; 53 knees had grade I or II chondromalacia and 39 knees had grade III or IV chondromalacia. Additional surgery was performed in 17 knees. Mean patient satisfaction score was 73 (range: 50-100) in the 39 knees with grade III or IV chondromalacia after arthroscopic debridement was performed. These findings suggest arthroscopic debridement in elderly patients has a place in the treatment algorithm for grade III or IV chondromalacia of the knee.


INTRODUCTION

Degenerative arthritis is the most frequent disorder of the knee in elderly patients.\textsuperscript{44} The Framingham study found a 30\% prevalence of knee osteoarthritis in individuals aged 65 to 74 years.\textsuperscript{13} Knee osteoarthritis is more likely to result in disability than osteoarthritis of any other joint.\textsuperscript{37} Knee osteoarthritis has a worldwide distribution, although there is variation in the prevalence among different ethnic or cultural groups and by gender.\textsuperscript{45} The symptoms of osteoarthritis are the effects of loose fragments of articular cartilage, debris, denuding of subchondral bone, degenerative tears of the menisci, loose bodies, osteophyte formation, synovitis, effusion, and limited motion caused by contractures, pain, and malalignment.\textsuperscript{38}

There are many treatment modalities available for the management of osteoarthritis including education, counseling, analgesics (nonsteroidal anti-inflammatories), glucosaminoglycans, intra-articular corticosteroid or hyaluronic acid injections, weight loss, physical and occupational therapy, ambulatory aids, orthotics, arthroscopic joint debridement, joint lavage, and joint replacement.\textsuperscript{19} When nonoperative management fails, surgery often is indicated. Joint arthroscopy is the least invasive surgical procedure and often involves debridement and lavage. Arthroscopic debridement has been used to manage patients with degenerative knee osteoarthritis, although there is little evidence documenting its efficacy for this purpose compared with joint replacement.\textsuperscript{7,31} Arthroscopy of the
knee is safe and effective, and currently is the most common orthopedic surgical procedure performed. The Ontario Health Technology Advisory Committee reviewed the evidence on effectiveness of arthroscopic lavage and debridement, including meniscectomy, for knee osteoarthritis. The authors concluded arthroscopic debridement of the knee was effective for medial compartmental osteoarthritis. Arthroscopic lavage without debridement of the knee was not indicated for any stage of osteoarthritis. Furthermore, the authors concluded there is poor quality evidence on the effectiveness of debridement with partial meniscectomy in the case of meniscal tears in osteoarthritis of the knee.

In a systematic review by the Centers for Medicare and Medicaid Services that included seven articles, it was suggested a subpopulation of patients with severe osteoarthritis (Outerbridge grade III and IV) exists who do not improve with debridement and lavage and for whom this procedure is not appropriate. All but one of these studies were case series, which are not considered to be reliable evidence for drawing conclusions; therefore, this study was undertaken to evaluate the success of arthroscopic debridement in elderly patients with grade III and IV chondromalacia of the knee as measured by patient satisfaction and the need for additional surgery.

MATERIALS AND METHODS

Patient Population

During the study period from December 1998 to August 2001, 7 orthopedic surgeons and senior registrars performed 1100 arthroscopic knee procedures each year at Tergooi Hospitals in Hilversum, The Netherlands. Of these, 102 procedures were performed in 99 patients aged >60 years (3 patients underwent bilateral arthroscopy).

Patients were refractory to nonoperative treatment and had persistent complaints. However, they did not manifest signs and symptoms that were severe enough to warrant total knee arthroplasty. When patient factors such as symptoms, medical condition, risk of anesthesia, risk of alternative surgery such as arthroplasty or osteotomy, and preference are considered, arthroscopic treatment of the degenerative knee may be performed. Patients with a history of rheumatoid arthritis, gout, hemophilia, and osteonecrosis were excluded from this study.

For each case, the orthopedic surgeon determined whether patients exhibited clear signs of mechanical abnormality based on either their history or physical examination. Mechanical symptoms were defined as a history of sudden pain, sudden exacerbation of pain, locking, giving way, or painful snapping or clicking. On physical examination, a finding of decreased range of motion, painful snapping or catching on range of motion, or a palpable loose body were considered mechanical symptoms. Preoperative plain radiographs were obtained, including weight-bearing anteroposterior (AP) and lateral views of the knee.

Surgical Technique

Knee arthroscopy was performed under general or regional (spinal) anesthesia. Patients were placed in a supine position on the operating table with the leg placed in a thigh support. A tourniquet was used in all cases on the upper thigh at a pressure of 350 mm Hg. Standard anterolateral and anteromedial arthroscopic portals were used. Infusion of irrigation fluid through the arthroscope was facilitated with a Dyonics infusion pump (Smith & Nephew, Andover, Mass). A 30° 4-mm arthroscope was used in all cases.

The joints were lavaged, and all intra-articular debris and loose bodies were removed. All meniscal disease was addressed by partial meniscectomies that preserved as much stable meniscal tissue as possible; in more severe cases, debridement was performed. The meniscectomies were performed using standard cutting instruments and a rotating suction shaver. No meniscal repairs were attempted. Articular cartilage defects were debrided using mechanical shavers. Any osteochondral fragments or articular cartilage fragments that potentially could detach and become loose bodies were removed.

In knees with grade III and IV chondromalacia, the remaining cartilage was shaved until bleeding bone was reached (abrasion arthroplasty). It is known that fibrocartilage forms at the abrasion site; the reparative tissue has many of the characteristics of cartilage but does not have the biomechanical properties of articular cartilage. In cases of hypertrophic reactive synovitis, a synovectomy was performed using a mechanical shaver to enable visualization of the torn menisci. Finally, the integrity of the anterior and posterior cruciate ligaments was assessed.

At the conclusion of surgery, the arthroscopic portals were closed with Steri-Strips (3M, St Paul, Minn). A light compressive dressing of cast padding and elastic bandage was applied from the mid calf to the mid thigh. Patients were allowed partial weight bearing on crutches for 5 days, after which they were allowed to progress to full weight bearing.

Articular Damage and Patient Evaluations

The presence of meniscal lesions during arthroscopy and the treatment for these lesions were evaluated. Knees also were assessed for articular surface degeneration using Outerbridge's scale for chondromalacia. At arthroscopy, articular damage was graded as:
TABLE
RESULTS OF ARTHROSCOPIC DEBRIDEMENT FOR CHONDROMALACIA OF THE KNEE IN PATIENTS AGED ≥60 YEARS

<table>
<thead>
<tr>
<th></th>
<th>Grade I or II Chondromalacia</th>
<th>Grade III or IV Chondromalacia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knees</td>
<td>53</td>
<td>39</td>
</tr>
<tr>
<td>Men/women</td>
<td>19/34</td>
<td>16/23</td>
</tr>
<tr>
<td>Mean age (range) (y)</td>
<td>70 (61-93)</td>
<td>70 (61-85)</td>
</tr>
<tr>
<td>Meniscal lesion</td>
<td>49</td>
<td>37</td>
</tr>
<tr>
<td>Additional surgery</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>High tibial osteotomy</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Unicondylar knee arthroplasty</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Total knee arthroplasty</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Mean satisfaction rating* (range)</td>
<td>Not measured</td>
<td>73 (50-100)</td>
</tr>
<tr>
<td>Mean follow-up (range) (months)</td>
<td>34 (7-104)</td>
<td>34 (19-50)</td>
</tr>
</tbody>
</table>

*On a visual analog scale of 0 to 100.

- Grade 0: normal articular cartilage,
- Grade I: softening and blistering of the articular cartilage,
- Grade II: fragmentation and fissuring in an area ≤1 cm,
- Grade III: fragmentation and fissuring in an area > 1 cm, and
- Grade IV: cartilage erosion down to the bone.

The worst grade in each knee was recorded. After arthroscopy, the intraoperative findings were reported on a schematic drawing. At follow-up, the need for and type of additional surgery was evaluated. Postoperatively, all patients were called and asked to complete a visual analog scale regarding their satisfaction with the result of the operation. The visual analog scale scores were graded from 0 to 100, with 100 indicating highest satisfaction.

RESULTS

Of the 99 patients (102 knees) aged ≥60 years, 32 were men and 67 were women. Arthroscopy was performed on the right knee in 56 cases and on the left knee in 46 cases. Mean patient age was 70 years (range: 61-93 years). Average follow-up was 34 months (range: 7-104 months). A meniscal lesion was found in 95 (93%) knees; a partial meniscectomy was performed in these knees. During arthroscopy, chondromalacia was found in 92 (90%) knees and no chondromalacia was found in 10 knees. Additional surgery was performed in 17 (17%) knees after a mean follow-up of 34 months (range: 7-104 months); total knee arthroplasty was performed in 11 knees, unicondylar arthroplasty was performed in 5 knees, and opening-wedge high tibial osteotomy was performed in 1 knee. No serious intraoperative or postoperative complications occurred during the follow-up period.

Grade I and II Chondromalacia

Fifty-three knees had grade I or II chondromalacia. Of these, 49 knees had a meniscal lesion, and a partial meniscectomy was performed. Mean patient age was 70 years (range: 61-93 years). Six knees required additional surgery that consisted of two unicondylar arthroplasties and four total knee arthroplasties (Table).

Grade III and IV Chondromalacia

Thirty-nine knees had grade III or IV chondromalacia (31 medial, 6 lateral, and 2 mediolateral). Mean age in this group was 70 years (range: 61-85 years). Mean patient satisfaction rating on the visual analog scale was 73 (range: 50-100) after arthroscopic debridement was performed (Table). Thirty-seven knees had a meniscal lesion and a partial meniscectomy was performed; mean patient satisfaction rating on the visual analog scale for these patients was 75 (range: 50-100).

Eleven knees required subsequent surgery. Mean patient satisfaction rating was 80 for the patients who did not need additional surgery, whereas for patients who required surgery, mean satisfaction rating was 58 after the arthroscopic procedure. Mean age of patients who had additional surgery was 71 years (range: 61-79 years). Additional surgery consisted of opening-wedge high tibial osteotomy in one knee after 22 months, unicondylar arthroplasty in three knees after mean follow-up of 9 months (range: 4-12 months), and total knee arthroplasty in 7 knees after mean follow-up of 20 months (range: 8-46 months).

DISCUSSION

In recent years, the treatment options for elderly patients with knee pathology have expanded. Arthroscopic surgery for degenerative disease of the knee was first in-
roduced in 1934 by Burman, Finkelstein, and Mayer. However, early debridement techniques such as those by Magnuson and Haggart were based on open (nonarthroscopic) procedures, and their use was limited because of the unacceptable level of morbidity and the prolonged recovery time. Improvement of arthroscopic techniques in the 1970s gave rise to procedures associated with less morbidity and quicker recovery times; hence, interest in these less invasive forms of knee surgery reemerged.

The purpose of our study was to retrospectively evaluate patient satisfaction and to analyze the need for further surgery after arthroscopic debridement for osteoarthritis of the knee in older patients.

Arthroscopic lavage involves the visually guided introduction of saline solution into the knee joint and the removal of the fluid, in effect “washing out” the joint by removing any excess fluid and loose bodies that might be present. The term arthroscopic debridement may include the introduction of saline into the joint, in addition to articular trimming, lavage, meniscectomy, removal of osteophytes, and articular abrasion. Arthroscopic debridement seems suited for elderly patients with significantly disabling knees that did not merit a more extensive operation. Certainly, these more limited procedures are preferable in patients whose poor medical conditions are contraindications to more invasive procedures or in patients who simply refuse more drastic alternatives. The cost effectiveness of knee arthroscopy in elderly patients is still under investigation.

Although knee arthroscopy is minimally invasive and can be performed under regional anesthesia, the outcome is not completely predictable and often is considered a temporary measure. Arthroscopy is a quick ambulatory operation with low morbidity, and it is difficult to attribute the success or failure of the operation to any specific part of the method.

Simple needle or arthroscopic lavage has demonstrated efficacy in obtaining pain relief in the osteoarthritic knee for at least 1 year postoperatively. In a prospective study by Kalunian et al that examined the effect of irrigation on knee pain, 90 patients with osteoarthritis were randomly selected to receive arthroscopic lavage using either 3000 or 250 mL of saline. The authors found patients who had 3000 mL of irrigation and intra-articular crystals had significant improvements in pain levels. The presence of macroscopic intra-articular crystals at baseline arthroscopic examination correlated with greater degrees of improvement in aggregate WOMAC and patient visual analog scale scores regardless of the amount of irrigation performed. Clinical improvement in the presence of crystals may be related to the removal of the crystals and perhaps only minimal irrigation is needed to achieve this outcome. However, the study did not include a placebo group for outcome comparison. The Ontario Health Technology Advisory Committee concluded arthroscopic lavage without debridement of the knee was not indicated for any stage of osteoarthritis. In an evidence-based review of arthroscopic lavage for osteoarthritis of the knee, Bazian concluded further well-designed clinical trials with long-term follow-up are needed to support the effectiveness of arthroscopic lavage with or without debridement.

Hubbard compared arthroscopic debridement with lavage in a randomized, controlled trial of 76 patients with clearly defined levels of degeneration of the articular cartilage of the medial femoral condyle. The primary outcome was pain and symptom relief. Of note, no meniscectomies were performed. Success or failure was determined by denoting the absence or presence of pain. The mean improvement in modified Lysholm score for the debridement group was 28 at 1 year and 21 at 5 years. There was a significant difference between the debridement and lavage groups at 1 year, with 32 patients in the debridement group and 5 patients in the lavage group reporting no pain (P = .05).

Arthroscopic debridement for the treatment of osteoarthritis of the knee remains controversial, and its efficacy has not been demonstrated by high-quality trials. One of the most important goals of this treatment is to delay the need for knee arthroplasty by controlling symptoms. In our study, only 11 of 39 knees with grade III and IV chondromalacia required further surgery after an average follow-up of 36 months. Because of the absence of a nonarthroscopic debridement control group, we cannot draw any conclusion from this. Not surprisingly, the patients in our study who did not need additional surgery were more satisfied (satisfaction rating of 80) than patients who needed subsequent surgery (satisfaction rating of 56). When the short-term need for additional surgery in patients with grade III and IV chondromalacia can be predicted, the satisfaction of the arthroscopically debrided patients can be improved.

In a randomized, controlled trial, Moseley et al concluded arthroscopic lavage and debridement in patients with painful osteoarthritis of the knee refractory to medical management was no better than placebo surgery at relieving pain and improving function. In a retrospective, unmatched case-control study, the prognostic factors for patients aged ≥40 years undergoing arthroscopic partial meniscectomy and limited debridement of coexisting degenerative articular surface erosion were determined. The control group did not have clinically significant articular degeneration. Of the 246 participants, 181 completed the study and were divided into two groups related to the severity of Outerbridge classification. Those with Outerbridge grade I and II comprised group 1 (63 patients) and patients with Outerbridge grade III and IV comprised...
group 2 (118 patients). With patient satisfaction as a measured outcome, patients in group 2 with more severe arthritis were less satisfied with their results.4

When arthroscopic surgery is indicated, well-recognized indicators that are predictors of a good outcome include radiographs indicating no or minimal degenerative arthritis; normal alignment or minimal malalignment; recent onset of symptoms within 1 year of presentation along with other indicators; mechanical symptoms such as locking, catching, giving way or buckling; loose bodies; unstable flaps of articular cartilage; symptomatic meniscus tears associated with localized pain; and impinging osteophyte.8

Goldman et al13 reviewed 8 published case series that included a total of 678 patients who underwent follow-up for an average of 38 months after arthroscopic debridement for the treatment of osteoarthritis. On average, 68% of the patients had a good result, which was defined by the authors as a relief of pain. Poor results were associated with advanced arthritis,2,16,32,59 malalignment,2,32,59 and non-mechanical symptoms unrelated to meniscal tears or cartilage flaps.32 Older patients with more advanced knee joint osteoarthritis may benefit less from arthroscopic debridement.41 One third of patients aged >70 years underwent total knee arthroplasty within 5 years following arthroscopic debridement.41

The finding that early knee replacement was more likely to be required for patients who were at least age 70 in regions with higher population rates of arthroscopic debridement supports the view that debridement may be overused in these patients.41 Given the success of total knee arthroplasty in this age group,5,18 the use of arthroscopic debridement may be unnecessarily delaying total knee arthroplasty.41 This and the fact that the rate of complications increases with advancing age should be taken into consideration when deciding which patients are appropriate candidates for arthroscopic debridement.41

Our study has several limitations; we did not consider patient preference, functional scores, risk perception, functional outcomes, cost effectiveness, or the indications for arthroscopic debridement. We agree with Day12 and Wu and Kalminian43 that arthroscopic debridement in elderly patients has a place in the treatment algorithm for knee osteoarthritis but only with accurate indications. In contrast to the Centers for Medicare and Medicaid Services,9 which concluded arthroscopic debridement is not reasonable and necessary for patients presenting with knee pain only or with severe osteoarthritis, we are of the opinion that there are strict8 indications for treating knees with grade III and IV chondromalacia with arthroscopic debridement. However, on the basis of this study, no recommendations can be formulated regarding which patients with grade III and IV chondromalacia should be treated with arthroscopic debridement. Although no recommendations can be made, we believe that elderly patients with grade III and IV chondromalacia of the knee are satisfied with the results of arthroscopic debridement and that this procedure can postpone additional surgery.

There is a need for better-designed clinical trials comparing arthroscopic debridement to established alternative treatments. The most important factor in determining success is proper patient selection; otherwise, many who have osteoarthritis of the knee will not benefit from arthroscopic debridement.12 The main objective of a future Cochrane review is to identify the appropriate use of arthroscopic debridement in knee osteoarthritis; perhaps this review will provide some clarity as well as accurate indications for arthroscopic debridement of the knee in elderly patients.23

REFERENCES


