Arthroscopic Debridement of the Knee in the Presence of Osteoarthritis

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Myles R.J. Coolican and Kunal Dhurve

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M.R.J. Coolican, MD, FRACS (✉)
K. Dhurve, MS (Ortho)
Sydney Orthopaedic Research Institute,
Chatswood, NSW, Australia
e-mail: mcoolican@sydneyortho.com.au

This chapter presents evidence to help answer the question as to whom, if anyone, with knee arthritis should undergo knee arthroscopy and provides recommendations on alternative treatments.

4.1 The History of Joint Debridement

Debridement of the knee joint for osteoarthritis was first described in English literature by Haggart in 1940 [1, 2] and by Magnuson in 1941 [3].

Pridie [4] presented to the British Orthopaedic Association in 1959 the results of his findings with re-exploration of four knees after previous extensive debridement that included drilling with a 0.25 in. drill bit into sclerotic bare bone on the medial condyle. The findings in the four patients whose surgery had not successfully relieved symptoms showed that the previously bare medial femoral condyle was covered by fibrocartilage. Insall reported the results of Dr Pridie's work in 1967 [5]. The patients had an average age of 53 years, and after the surgery, 79 % functioned with little or no pain and 84 % flexed to 90° or more. Seventy-seven per cent of the patients thought the operation was a success. Pridie, as well as Haggart and Magnuson, emphasised the importance of correct patient selection in performing knee debridement. The patients were more likely to be happy with their operation if they were middle aged, robust, and capable of a vigorous rehabilitation programme.

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There were subsequently few other reports of the results of open debridement, and it is an operation that did not stand the test of time. The advent of joint arthroplasty in the 1970s replaced joint debridement, and around this time, arthroscopic surgery that had developed in Japan in the first half of the twentieth century gradually became more popular and widespread in Europe, North and South America, and Australasia. Until the 1960s, it was a surgical procedure confined largely to Japan. Not surprisingly, the advent of arthroscopy saw a resurgence of joint debridement for osteoarthritis particularly in patients whose symptoms and radiographic wear were not considered sufficiently advanced to merit joint replacement. The enthusiasm for arthroscopic treatment of the mild to moderately arthritic knee in the 1980s and 1990s was unprecedented given its lower morbidity compared with open debridement. But, it should also be pointed out that an operation that by and large had at the most moderate success as an open procedure would likely have much the same results when performed with the lower morbidity arthroscopic procedure. Subsequent years have seen the publication of several well-conducted trials evaluating the efficacy of arthroscopic knee surgery for osteoarthritis and have shown arthroscopic debridement to be no better than other non-operative treatments. Whilst the results of these studies are well recognised in the orthopaedic community, there has been surprisingly little alteration in the rates of surgery across the globe.

4.2 Trends in the Rate of Arthroscopic Knee Surgery

Wai et al. [6] published in 2002 a study of the incidence of arthroscopy from 1992 to 1996 in Canada (Fig. 4.1). It was a population-based comparison of patients over the age of 50 undergoing arthroscopic surgery. At 12 months following arthroscopic surgery, 9.2 % of patients had undergone a total knee replacement, and this figure was 19 % for those over the age of 70.

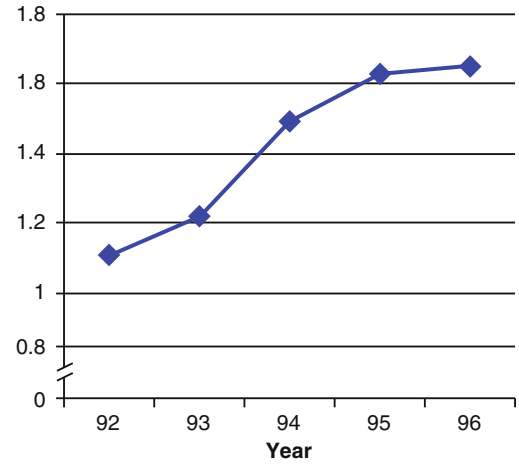

Fig. 4.1 Age and gender-adjusted population rates (per 1000) of arthroscopic knee debridement by year [6]

Hawker et al. [7] in 2008 published a population-based comparison of the incidence of arthroscopy in Bristol, UK, and Ontario, Canada, for the years 1993, 1997, 2002, and 2004. Whilst the performance of arthroscopy mostly increased over time in both nations, there was a fall in Ontario between 1993 and 1997 followed by an increase. The authors compared the incidence of arthroscopy in each of the four income quartiles for both regions and found that the highest rate of arthroscopy was in the higher income quartile for both nations. In Bristol, 4.8 % of the patients progressed to a total knee replacement over the subsequent 12 months, and for Ontario, Canada, this figure was 8.5 %. In the same years in Bristol, 2.7 % of all patients undergoing total knee replacement had undergone an arthroscopic procedure in the prior 12 months, and in Canada this figure was 5.7 %.

Dearing and Brenkel [8] in 2010 looked at the incidence of arthroscopy across 15 health regions in Scotland. They described a marked regional variation from a high of 36 arthroscopies per 100,000 population to a low of 5. The authors also reported on the incidence of total knee replacement in the same period within each region and demonstrated a poor match on the incidence of arthroscopy and total knee replacement. This work did not indicate if the incidence of arthroscopy was related to patient-surgeon ratios.

Harris et al. [9] reported in 2013 on the incidence of arthroscopy in Australia. Whilst there have been a steady number of total arthroscopies performed in the period 2000–2008, there has been a slight decline in the public sector and an increase in the private sector. Interestingly, these rates are approximately ten times the greatest incidence of arthroscopy performed in Tasmania. The age groups from 45 to 64 and 65 to 74 show an increasing rate, whilst other age groups are declining. The conversion rate to a total knee replacement within 24 months of total knee replacement declined from 23.2 % in 2000 to 20.1 % in 2006.

Bohensky et al. [10] utilised rates of total knee replacement for comparison with the incidence of arthroscopy rather than relying on population base alone, their reasoning being that rates of all types of knee surgery are increasing and the rate of TKR could be an indexed comparison. Whilst this group demonstrated a decrease in arthroscopy rates overall in the period 2000–2009, there was no decrease in patients with a diagnosis of arthritis undergoing arthroscopic surgery.

A summary of the trends in arthroscopic knee surgery would indicate that across the globe, orthopaedic surgeons are performing arthroscopic knee surgery at the same or greater rates in the past 15 years with a marked regional variation not necessarily explained by surgeon numbers or method of remuneration. Over 20 % of patients aged greater than 60 years undergoing knee arthroscopy have a total knee performed within 2 years, and it is likely that the arthroscopic surgery was either unnecessary or possibly contributed to the deterioration of the knee.

4.3 Literature Review Arthroscopic Lavage

The principle of arthroscopic lavage is to remove chondral debris, loose synovial fragments, and synovial fluid with associated inflammatory cytokines from the joint. This can be achieved with either separate inflow or outflow points through two portals, or lavage may be tidal with variations in volume of fluid and length of time it is in contact with the joint.

Earlier observational studies suggested there were benefits to knee lavage. Livesley et al. [11] in 1991 showed significant benefit of washout over physiotherapy, and Jackson and Dieterichs [12] in 2003 reported a retrospective series of significant relief lasting 1–5 years after washout.

In 2000, Kalunian et al. [13] published a multicentre randomised double-blind placebo controlled trial of 90 patients. Group 1 received arthroscopic irrigation with 3000 ml, whilst group 2, the placebo group, received 250 ml of arthroscopic irrigation. There was improvement in pain at 12 months in favour of full irrigation which was found to be of particular benefit in patients with crystal arthropathy.

A Cochrane review published by Reichenbach et al. [14] in 2010 included seven small series. There was little evidence in these series of benefit in pain relief or function at 3 months and at 1 year with the authors commenting that trials with a sham procedure that closely mimicked lavage showed a clear null effect. The small improvements seen in some trials at 1 year may be due to chance. Arthroscopic lavage for the treatment of osteoarthritis was not recommended.

4.4 Arthroscopic Debridement for Osteoarthritis

Arthroscopic debridement of the knee has been practised since arthroscopy became a popular procedure in the 1970s. Success rate for arthroscopic debridement of the osteoarthritic knee range from 40 to 75 % with multiple authors – Baumgaertner et al. [15], 1990; Harwin [16], 1999; Hubbard [17], 1996; McGinley et al. [18], 1999; McLaren et al. [19], 1991; Shannon et al. [20], 2001; Sprague [21], 1981; and Timoney et al. [22], 1990, all reporting good outcomes with pain relief and function. Some of these authors (Baumgaertner, Shannon, Timoney, Hubbard, and McLaren) showed that palliative effects were maintained for 2–5 years with McGinley, Harwin, and Aicroth, 1999; Fond et al. [23], 2002; and Dervin et al. [24], 2003, showing the palliative effects were maintained for between 7 and 13 years. Predictors of a positive outcome were young patients with a

short duration of symptoms who had early osteoarthritis on radiographs without malalignment and who had mechanical symptoms.

Two randomised trials were published in the 1990s comparing arthroscopic debridement to lavage. Chang et al. [25] in 1993 reported on 18 patients who underwent arthroscopic debridement compared with 14 patients who underwent joint lavage using a tidal system. This was to our knowledge the first published study to cast doubt on the efficacy of arthroscopic debridement to treat osteoarthritis. A single-blinded assessor was utilised at each site with outcome assessments being made at 3 and 12 months utilising the pain and functional status scales from the Arthritis Impact Measurement System (AIMS). Withdrawals at the 12-month mark were 22 % for the arthroscopy group and 7 % of the lavage group. There were no statistically significant differences between the groups at 3 months and 12 months.

Hubbard [17] compared 14 patients undergoing arthroscopic debridement with 36 undergoing a washout for 'degeneration of the medial femoral condyle'. Pain and function were measured with the Lysholm score. The outcome assessors were neither independent nor blinded with the loss to follow-up being 20 % of the debridement group and 28 % for the washout group. There was a significant difference in pain relief at 1 and 5 years in favour of the arthroscopic debridement group.

In 2002, Moseley et al. [26] published a blinded control trial in which there were three groups, 59 patients underwent arthroscopic debridement, 61 underwent arthroscopic lavage, and 60 had placebo surgery with a short-acting IV tranquiliser and an opioid. In the placebo group where the patients were partially conscious, they were kept in the operating theatre for the same amount of time as arthroscopic debridement, and flushing sounds and requests for instruments by the surgeon were made to mimic arthroscopic lavage or surgery. Of the 324 eligible patients (mostly male veterans), 56 % participated possibly producing a selection bias. There was a 10 % loss to follow-up in each group with results being presented on 163 patients who completed the trial to 2 years follow-up. Pain was measured with the Knee Society pain score, physical function with the AIMS 2, and SF36 at week 2 and week 6 and at the 3, 6, 12, and 24 months mark. There was no statistically significant difference between the arthroscopic debridement and the lavage group. There were however differences between the arthroscopic group and the placebo with these reaching significance favouring the placebo group at the 2 weeks and 12 months. Other than at the 18-month mark, the placebo group scored higher on the mean knee-specific pain scale score and the AIMS 2 walking-bending subscale across the 2-year period. Criticisms of this study included that non-validated measurement scales were utilised, and in addition, there was no non-operative comparative group.

In 2008, Kirkley et al. [27] published a single-centre randomised control trial comparing two groups. The treatment group underwent a combination of knee lavage and arthroscopic debridement followed by optimised medical and physical therapy for osteoarthritis of the knee. The control group had optimised medical and physical therapy alone. Of the 188 patients who randomised, 168 completed the study with a participation rate of 89 %. There were a number of exclusion criteria including patients with bucket-handle meniscal tears, Kellgren-Lawrence grade 4 in 2 compartments, prior arthroscopy for knee arthritis, and varus deformity greater than 5°. WOMAC and SF36 were utilised to measure outcomes. The groups were similar in their use of medical therapy including non-steroidals, paracetamol, chondroitin, and hyaluronic acid injections as well as participation in physiotherapy. Although the arthroscopic group started with a worse (higher) mean WOMAC score, there were no significant differences between the two groups at all time points. A separate analysis between surgical and non-surgical management was made for several subgroups. Patients with Kellgren-Lawrence grade 2 (milder wear) had no better results with surgery than the non-operative group, and similarly, there was no benefit with surgery in Kellgren-Lawrence grades 3 and 4 (more advanced wear) or in patients with mechanical symptoms such as catching and locking. The authors' conclusion was that arthroscopic surgery

for osteoarthritis of the knee provided no additional benefit to optimised physical and medical therapy.

A Cochrane review by Laupattarakasem et al. [28] in 2008 concluded that there is 'gold' level evidence that arthroscopic debridement has no benefit for undiscriminated osteoarthritis whether the symptoms are a consequence of a mechanical or an inflammatory cause.

4.5 Arthroscopic Meniscectomy for Degenerative Tears with Little or No Osteoarthritis

Whilst it is accepted by most orthopaedic surgeons that arthroscopy has an extremely limited role in the management of osteoarthritis, arthroscopic surgery for degenerative tears of the meniscus in the presence of little or no osteoarthritis is a commonly performed procedure. There is some doubt as to whether this procedure is always necessary with studies demonstrating physical therapy may resolve symptoms in a majority of patients. In 2013, Sihvonen et al. [29] published a multicentre randomised double-blind sham-controlled trial of 146 patients without osteoarthritis who were suffering degenerative medial meniscal tears. The patients were randomised to arthroscopy or sham surgery. Patients were followed up at 2, 6, and 12 months. The Lysholm score was identical for the patients at baseline and at the 2, 6, and 12 months, whilst the WOMET score was very similar at baseline and higher (favourable) for the arthroscopic meniscectomy group at 2 and 6 months, but at 12 months the groups were the same. A similar pattern was seen with pain after exercise in the two groups being similar at baseline, better at 2 and 6 months in the arthroscopic partial meniscectomy group and identical at 12 months. The conclusion after this trial involving patients without knee osteoarthritis but with symptoms of a degenerative medial meniscal tear was that the outcomes after arthroscopic partial meniscectomy are no better than those after a sham surgical procedure.

Herrlin et al. [30] reported in 2007 and again in 2013 [31] on a prospective randomised study of patients with a degenerative medial meniscal tear without osteoarthritis. A feature of these studies is patients declining to participate with the non-participation rate being 41 %. Non-traumatic meniscal tears were divided into two groups: those that underwent arthroscopic partial medial meniscectomy followed by physiotherapy/exercise and those who underwent physiotherapy/exercise alone. KOOS, Tegner, Lysholm, and a visual analog scale were utilised to measure outcomes. Whilst the arthroscopy and exercise group scored slightly better on all KOOS scales than exercise alone, both were substantially improved. At 8 weeks the scores were similar for both the arthroscopic/exercise group and the exercise alone group and this continued at 6 months. The authors' conclusion was that there was no significant benefit from meniscectomy using any of the outcome measures at 8 weeks and 6 months. A further publication from Herrlin et al. [31] on the same group of patients reported the results of the same cohort at 2 and 5 years after the intervention. This showed that both groups enjoyed highly significant clinical improvements from baseline to follow-ups at 2 and 5 years on all subscales of KOOS as well as the Lysholm score and VAS. However, there were no differences between the groups. It is important to point out that one third of the patients who were treated with exercise therapy alone were unimproved after this treatment but were improved after arthroscopic surgery. The authors conclude that exercise therapy can be recommended as an initial treatment with arthroscopy reserved for those who failed to improve and that this group of patients who undergo delayed surgery achieve the same results as those who were immediately randomised to surgery.

4.6 Evidence-Based Guidelines and Statements

A review of past and current evidence-based guidelines for the treatment of osteoarthritis with surgery – either lavage or debridement – shows a gradual alteration from reluctance to recommend lavage to specific recommendations against this surgery.

In 2008, guidelines issued by the British National Health Service, National Institute for Health and Clinical Excellence (NICE) [32], concluded that evidence on the safety and efficacy of arthroscopic knee washout with debridement for the treatment of osteoarthritis is adequate to support the use of this procedure provided that normal arrangements are in place for consent, audit, and clinical governance. The 2008 guidelines also suggested that current evidence showed that arthroscopic knee washout alone should not be used as a treatment for osteoarthritis because it could not demonstrate a benefit in the short or long term. In 2014, an update on these guidelines was more specific stating that patients should not be referred for arthroscopic lavage or debridement as part of treatment for osteoarthritis unless the patient with knee arthritis has a clear history of mechanical locking, as opposed to morning stiffness, giving way or X-ray evidence of loose bodies [33].

Guidelines issued jointly by the British Orthopaedic Association, the British Association for Surgery of the Knee, the Combined Charter of Physiotherapy, and the Royal College of Surgeons of England in 2013 stated that knee arthroscopy, lavage, and debridement should be considered in patients with a clear history of mechanical symptoms, for example, locking, who have not responded to at least 3 months of non-surgical treatment. This group also recommended arthroscopy when a detailed understanding of the degree of compartment damage within the knee is required above that demonstrated by imaging, for example, when considering patients for surgical intervention such as a high tibial osteotomy. The guidelines also concluded that knee arthroscopy, lavage, and debridement should not be offered to patients with the non-mechanical symptoms of pain and stiffness.

The Australian Knee Society, after a review of the literature and consensus meeting in 2014, published on its website a series of statements concerning arthroscopic treatment for osteoarthritis of the knee as presented below.

> Arthroscopic debridement and/or lavage have been shown to have no beneficial effect on the natural history of osteoarthritis. Nor is it indicated as a primary treatment in the management of osteoarthritis. Notwithstanding, this does not preclude the use of arthroscopic surgery where indicated to manage symptomatic coexisting pathology in the presence of osteoarthritis.
>
> There are certain clinical scenarios in which arthroscopic surgery, in the presence of osteoarthritis, may be appropriate – albeit after considered discussion with the patient. These include, but are not necessarily limited to, the following:
>
> - Known or suspected septic arthritis
> - Unstable meniscal tears after an appropriate trial of non-operative treatment
> - Symptomatic loose bodies
> - Meniscal tears that require repair
> - Inflammatory arthropathy requiring synovectomy
> - Synovial pathology requiring biopsy or resection
> - Unstable chondral pathology causing mechanical symptoms
> - As an adjunct to, and in combination with, other surgical procedures as appropriate for osteoarthritis: for example, high tibial osteotomy and patello femoral realignment
> - Diagnostic arthroscopy when the diagnosis is unclear on MRI

The American Academy of Orthopaedic Surgeons 2nd Edition Evidence-Based Guidelines for Treatment of Osteoarthritis of the Knee rates the strength of their advice based on available knowledge as either strong or inconclusive [34]. Their Recommendation 12 in May 2013 states ‘we cannot recommend performing arthroscopy with lavage and/or debridement in patients with a primary diagnosis of symptomatic osteoarthritis of the knee. Strength of recommendation: strong’. In Recommendation 13, ‘we are able to recommend for or against arthroscopic partial meniscectomy in patients with osteoarthritis of the knee with a torn meniscus. Strength of recommendation: inconclusive’.

4.7 Summary and Conclusions

The role of arthroscopic surgery to manage osteoarthritis of the knee is extremely limited and has been shown to be no more effective than sham surgery. However, its use as a treatment modality continues across the globe. A summary of current evidence-based guidelines from multiple respected national bodies recommends against the use of

arthroscopy as a treatment for knee osteoarthritis. Patients with a degenerative medial meniscal tear should undergo surgery if the symptoms are not relieved by a structured physiotherapy programme including resistance exercises, and approximately one third of these patients will require surgery.

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