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Arthroscopy as a Treatment for Knee Osteoarthritis

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Abstract

Since surfaces become irregular and debris from cartilage and meniscus gets released into the joint cavity of osteoarthritic joints, washing away this debris and attendant crystals, smoothing rough surfaces and repairing tears might help patients with disease. Such interventions are accomplished during an arthroscopy, when a fiberoptic endoscope and surgical instruments are inserted into the knee. While initial uncontrolled case series suggested that arthroscopy alleviated pain in patients with osteoarthritis, large randomized trials have suggested that arthroscopy has a limited role as a treatment of osteoarthritis.

Keywords

Knee Osteoarthritis; Arthroscopy

As osteoarthritis develops, cartilage fibrillates releasing debris into the joint, degenerated menisci can sometimes tear and synovium can proliferate perhaps in an attempt to clear the joint of the accumulating detritus that is part of the disease process. The origin of pain and discomfort in osteoarthritis is not well appreciated but it is likely that synovitis which is triggered by phagocytosis of detritus released into synovial fluid itself produces pain. Crystals that can be part of this debris can themselves induce inflammation. Also some of the irregularities in the joint surface can cause minor mechanical obstructions which can get in the way of smooth joint excursion, thereby causing discomfort. This combination of factors would suggest that entering the joint and removing this debris along with crystals and synovitis and any irregularities seen on the surface would be likely to make the patient feel better, lessening pain. Such procedures are arthroscopies and they have been advocated for the treatment of osteoarthritis of the knee and other joints. Evidence on their efficacy is controversial, and this paper will review that evidence.

Arthroscopy

Arthroscopy is a minimally invasive surgical procedure in which a fiberoptic endoscope is inserted into the joint through a small incision. The surgeon makes a second incision through which to insert surgical instruments that can be used to debride or resect areas within the knee under visualization of the scope. A variety of treatments can be delivered by arthroscopy, and different elements of treatment might well determine the efficacy of the arthroscopy in

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osteoarthritis. The possibilities include the following: 1.) washing the joint out with saline to get rid of debris and crystals which may be inducing pain and inflammation 2.) debridement of torn menisci and removal of fragments of menisci or of other structures such as torn ligaments 3.) Resection of proliferative synovium 4.) Excision and removal of loose articular cartilage fragments and smoothing over of cartilage lesions 5) Removal or grinding down osteophytes that block full extension of the joint and an intervention rarely used in osteoarthritis studies, 5.) Drilling of osteochondral lesions.

Evidence on Efficacy of Arthroscopy in Osteoarthritis

For many years arthroscopy was commonly performed to treat knee osteoarthritis with the process including lavage of the joint and debridement of roughened surfaces with removal of loose debris. Meniscal tears were often resected or repaired as part of this process. Uncontrolled case series suggested that arthroscopy was effective with improvements lasting a year or more. In the largest and perhaps most comprehensive of these studies, Aaron and colleagues (1) studied 122 patients of whom 110 got follow. The Knee Society pain score, a global measure of knee pain, improved on average by 11.9 (out of a total of 50 points). When defined as a post-operative pain score of greater than 30 points (higher scores connote better status), 65% of the patients had substantial pain relief. Improvement extended up to 36 months and was far more likely if the patients presented with relatively mild osteoarthritis (Kellgren and Lawrence Grade 2 versus Grade 3, for example) (2) had normal alignment and had preserved joint space. Those factors that tended to weigh against improvement with arthroscopy were the opposite of those that portended a good result, severe arthritis, malalignment and advanced joint narrowing. These findings and those of other case series which reported, if anything, rosier results than this study suggested that arthroscopy had a therapeutic role in treating patients with knee osteoarthritis.

The first randomized trial evaluating arthroscopy was done as a comparative trial versus lavage and its main goal was actually to evaluate tidal lavage, large volume lavage of the knee, as treatment for knee osteoarthritis comparing it with what was thought then to be a gold standard effective treatment, arthroscopy. There were no significant differences between the lavage group and the arthroscopy group at three or twelve months follow up. However, the trial was small (only 32 patients total) and may have been underpowered to detect differences suggested by the data, for example, assessments by patients suggested that there was more improvement in the arthroscopy than in the lavage group (e.g. 56% had improvement in pain score in the arthroscopy group at twelve months versus only 43% in the lavage group). Physician designated improvement was also more common in the arthroscopy group although not significantly so, but some of the outcomes were actually in the opposite direction with patient global assessment suggesting a better result for lavage than for arthroscopy at twelve months. Thus, this trial comparing lavage and arthroscopy came to indeterminate results with no significant differences between the two modalities of therapy. The small sample size precluded the detection of small and potentially clinically important differences (3).

These uncontrolled and early randomized trials are the background against which a milestone randomized trial was carried out with arthroscopic surgery being compared to sham surgery (4). In this trial 180 patients with OA were randomly assigned to receive one of three treatments: arthroscopic debridement which as a treatment modality consisted of all of the different elements of arthroscopy noted earlier in addition to lavage, arthroscopic lavage alone (in this treatment group, unstable meniscal tears were resected but no other debridement was done) or sham surgery. This latter treatment arm was novel and included three one centimeter incisions made to mimic the arthroscopic portals and noises and instrumentation that suggested arthroscopy was being done along with a stay overnight in the hospital. Patients were later found to be blinded with respect to whether they had undergone the procedure or not.

The Moseley trial results showed absolutely no efficacy of arthroscopic debridement or lavage vs. sham surgery. Both the unique outcome measure that was the primary measure in this study, the knee specific pain scale score nor other more widely accepted secondary outcome measures showed any difference between the debridement, lavage or placebo surgery groups. No differences were seen even as long as three years after surgery with follow up being excellent. While small differences between debridement and placebo might not have been detected given the modest sample size of the study (roughly 60 in each group) at no point in follow up did the debridement group on average do better than placebo.

There were a number of unique features to the Moseley trial that created concern by readers about the generalizability of its results. First, the trial was done at the U.S. Veterans Administration in primarily men. Second, all arthroscopies were performed by only one surgeon whose own practice techniques may have been relevant to the success or failure of the procedure. Third, prominent mechanical symptoms of osteoarthritis such as catching or locking were not ascertained and were not used as eligibility criteria for this trial, so that potential effects of arthroscopy on these symptoms were not characterized. Lastly, an unusual and novel pain evaluation was carried out with a newly developed knee specific pain scale.

Because of the concerns about generalizability that were raised in the Moseley trial, a group of Canadian investigators led by Kirkley et al (5) undertook another randomized trial looking at the efficacy of arthroscopy in a broader, more generalizable sample of patients with knee osteoarthritis. The study design varied from that of Moseley in that no sham surgery was included and the only active treatment that was evaluated was debridement with lavage. It was compared against no surgery with all patients in both groups given conventional therapy including optimized physical therapy. Many of the peculiarities of the Moseley study were resolved in this study by Kirkley et al. Specifics included: the predominance of women (63% of subjects) in the Kirkley study, the use of a well validated, widely used outcome measure in osteoarthritis trials, the WOMAC, the characterization and inclusion of mechanical symptoms in the knee; and the use of multiple surgeons with an agreed upon treatment protocol that included lavage, debridement, synovectomy, excision of degenerative tears in the meniscus and of fragments of cartilage and excision of osteophytes that prevented full extension. Like other published trials of arthroscopy, micro-fracture of chondral defects was not performed. The physical therapy was comprehensive and standardized.

Results showed no difference at one or two years between the group that was randomized to arthroscopy, and that randomized to control. Not only was pain not improved by arthroscopy vs. the control, mechanical symptoms were not affected by treatment either. Even though uncontrolled studies had suggested and orthopedic clinicians had suggested in letters after the Moseley study that the patients who benefited most were those with milder osteoarthritis, the Kirkley trial reported that in those with milder grade 2 disease, there was also no effect of arthroscopy on symptoms. A variety of secondary outcomes were evaluated, and these also showed no difference between arthroscopic treatment and placebo. In general, the Kirkley trial resolved any remaining issues about the efficacy of arthroscopy that had not been answered by the Moseley trial. It showed that, in general, there is no role for arthroscopy as a treatment of osteoarthritis.

The results of these well done, randomized trials evaluating arthroscopy provide important examples of how randomized trial data is sometimes necessary to evaluate treatments that we trust to be effective. It is noteworthy that in both trials there was improvement over one year to two year in all patients treated not just in those undergoing arthroscopy and that may have been why the uncontrolled studies of arthroscopy were so favorable. The failure of arthroscopy to be effective suggests that all elements of that treatment are ineffective. Specifically lavage, the washing out of the knee to get rid of debris and crystals, while it may have a temporary

beneficial effect, clearly has no long term effect .(This null result as has been suggested by trials of lavage itself). Also, removing debris at the surface of cartilage or even in the meniscus is unlikely to have any beneficial effect as is the operative treatment of degenerative tears especially those that are not unstable (unstable tears in older osteoarthritis patients are quite uncommon).

In an editorial accompanying the trial by Kirkley, a prominent orthopedic surgeon (Marx)(6), asked whether arthroscopy should ever be done in patients with osteoarthritis. He suggested that in a patient with mild or no osteoarthritis and who has a clear-cut, acute injury involving twisting or other knee trauma and whose symptoms date clearly to that injury where an MRI demonstrates a remediable lesion likely due to the injury, that arthroscopy is indicated and might be of great help to the patient. It is in the more common scenario of patients with chronic osteoarthritis who usually have co-existent meniscal tears that arthroscopy is of no value.

In summary, arthroscopy, while shown to be promising in uncontrolled studies, has now been convincingly demonstrated to not be efficacious for the treatment of osteoarthritis. It should not be carried out to help patients with osteoarthritis except perhaps if there is evidence of recent trauma and a symptomatic meniscal tear.

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