

Guest editorial

Routine knee arthroscopic surgery for the painful knee in middle-aged and old patients—time to abandon ship

Knee arthroscopic surgery is one of the most common orthopedic procedures. Introduced in Scandinavia in the late 1970s, it replaced and improved earlier open knee procedures, changed most of them from inpatient surgery to outpatient surgery, and drastically cut patient recovery time. Earlier case reports of open surgery had suggested that in the presence of “degenerative” changes in the joint at the time of meniscectomy, patients improved—but less so than in the absence of such changes (Jackson 1968, Appel 1970). Subsequent reports, now using arthroscopic surgery, again suggested poorer results in patients with cartilage changes (Lysholm and Gillquist 1981, Northmore-Ball and Dandy 1982, Gillquist and Oretorp 1982, Hamberg and Gillquist 1984).

In spite of these early reports, middle-aged and older patients with a painful knee and suspected meniscus or cartilage lesion have become by far the most common patient group to be treated with arthroscopic knee surgery. Thus, 3 out of 4 patients who are treated arthroscopically for suspected meniscus rupture, cartilage lesion, or osteoarthritis of the knee are reported to be older than 35, the typical patient being between 35 and 65 years old and most often in their early fifties (Roos and Lohmander 2009, Cullen et al. 2009, Bohensky et al. 2012, Dearing and Brenkel 2010, Thorlund et al. 2014).

It took some 20 years after the general introduction of knee arthroscopic surgery, with millions of patients treated, before the first randomized controlled trial was published (Moseley et al. 2002). This pivotal, double-blind trial compared 3 interventions: lavage, debridement, and sham surgery in patients (mean age 52 years) with knee osteoarthritis. All 3 study groups improved, with no significant difference between the 3 in the 2-year outcomes. To date, at least 8 additional randomized trials investigating the effect of debridement and/or arthroscopic partial meniscectomy have been published (Chang et al. 1993, Herrlin et al. 2007, Kirkley et al. 2008, Österås and Österås. 2012, Katz et al. 2013, Yim et al. 2013, Sihvonen et al. 2013, Gauffin et al. 2014). In these trials, all, some, or none of the patients included (with a mean age of between 50 and 63) had a diagnosis of knee osteoarthritis. All but 1 of these 9 trials of arthroscopic surgery in middle-aged or older people with persistent knee pain failed to show any added benefit of interventions including arthroscopic surgery over a variety of control treatments. 7 of the 9 trials were not run with blinding, and part of the observed inconsequential benefit may be explained by the more marked placebo effect

of surgery compared to non-surgical interventions (Zhang et al. 2008, Bannuru et al. 2015). 2 trials were double-blinded and included sham surgery, with no difference found between intervention groups.

A recent systematic review and meta-analysis concluded that interventions that include arthroscopic surgery are associated with a small benefit and with harms, that the small benefit is inconsequential and of short duration, and that it is markedly less than that seen from exercise therapy as treatment for knee osteoarthritis. The findings do not support the routine practice of arthroscopic surgery as treatment for middle-aged or older patients with knee pain with or without signs of osteoarthritis (Thorlund et al. 2015).

Here it would be prudent to reiterate that most of these patients who are treated with arthroscopic surgery improve following the intervention. However, “Supporting or justifying a procedure with the potential for serious harm, even if this is rare, is difficult when that procedure offers patients no more benefit than a placebo” (Carr 2015).

Administrative statistics suggest that the consistent and high-level evidence available that brings the benefit of arthroscopic surgery into doubt has had a limited effect on the practice patterns of arthroscopic surgery in middle-aged and older patients with a painful knee and a suspected meniscus or cartilage lesion (Cullen et al. 2009, Bohensky et al. 2012, Dearing and Brenkel 2010, Lazic et al. 2014, Thorlund et al. 2014).

This issue of *Acta Orthopaedica* presents 2 reports that are relevant to the practice of arthroscopic knee surgery for the painful knee (Bergkvist et al. 2016, Mattila et al. 2016,).

Mattila et al. (2016) report on differences and changes in rates of arthroscopy due to degenerative knee disease and traumatic meniscal tears in Finland and Sweden between 1997 and 2012. They found that the arthroscopy incidence per 100,000 person-years was 2–4 times higher in Finland than in Sweden for both degenerative knee disease and traumatic meniscus tears. They also noted that although the incidence of arthroscopy for osteoarthritis decreased over time, the corresponding incidence for degenerative meniscus tears was essentially the same at the beginning and the end of the observation period, both in Finland and in Sweden. In Finland, the incidence of arthroscopic surgery for traumatic tears increased over time, but it remained stable in Sweden. Of further note was that every second meniscal tear was coded as traumatic in Finland,

while the corresponding proportion in Sweden was 1 in 4. In their discussion, the authors note that it is unlikely that these differences reflect underlying differences in morbidity burden between the 2 countries, but rather reflect differences in physician beliefs about diagnosis and surgery indications, surgical coding practices, insurance policies, and patient attitudes. For Denmark, Thorlund et al. (2014) reported that the incidence of arthroscopic meniscal procedures per 100,000 person-years doubled from 164 to 312 between the years 2000 and 2011, with a 3-fold increase in those aged over 55. Remarkably, these 3 Scandinavian countries—all with national health insurance systems, high-quality administrative databases, and rather similar populations—thus show a 5-fold difference in the incidence of meniscal procedures. There are also incidence differences of similar magnitude between healthcare regions within Sweden and within Denmark and Norway (Open comparison, www.skl.se, Hare et al. 2015, www.helseatlas.no).

These differences in incidence and changes over time, together with the mounting evidence against benefits of arthroscopic surgery over non-surgical interventions, underscore the importance of a better understanding of the treated patient population, and the diagnostic criteria on which surgical coding is based. To this end, Bergkvist et al. (2016) investigated all 4,096 knee arthroscopies in southern Sweden performed between 2007 and 2009: who gets them, what the radiologist reports, and what the surgeon finds. They found that half of the arthroscopies had a diagnostic code consistent with an old tear or injury, or with osteoarthritis. Of these, two-thirds had findings on arthroscopy consistent with a degenerative meniscal tear, and half had knee osteoarthritis based on radiographs or MRI. This carefully collected information suggests that a large proportion of arthroscopic surgeries performed are done in patients where current high-level evidence does not support the practice of arthroscopic surgery.

Arguments favoring arthroscopy have focused on the putative existence of patient subgroups among the middle-aged and elderly with a painful knee, where arthroscopic surgery may be effective. However, such subgroups (e.g. with or without osteoarthritis, with or without mechanical symptoms) have not yet been possible to define (Thorlund et al. 2015). Adding to the difficulty of defining a subgroup of responders is the limited reliability of the clinical diagnosis of a symptomatic meniscal tear in this population: symptoms are often similar to those of early-stage osteoarthritis (Dervin et al. 2001, Niu et al. 2011, Hare et al. 2014). This should not be surprising, considering the high prevalence of meniscal lesions in middle-aged or older people, most often associated with other structural joint changes characteristic of osteoarthritis, in the presence or absence of joint symptoms (Englund et al. 2008, Guermazi et al. 2012).

The findings summarized in this editorial should remind us that clinical impressions can be deceiving (Cobb et al. 1959, Horton 1996, Wartolowska et al. 2014). When high-level evidence speaks against clinical experience and unquestioned

routine, cognitive dissonance results (Miller and Kallmes 2010). Defenders of questioned treatments focus on possible scientific flaws in the published trials to invalidate trial results, to decrease their level of cognitive dissonance, while at the same time they ignore the inherent bias of clinical experience. Another hurdle is confirmation bias making us ignore, or not want to be exposed to, information or opinions that challenge what we already believe, while readily accepting information and beliefs that confirm what we already believe. This very human trait contributes to overconfidence in personal beliefs and strengthens beliefs in the face of contrary evidence. The effects are stronger for emotionally charged issues and deeply entrenched views (Lohmander and Roos 2015).

Part of the debate following the first pivotal trial and subsequent publications has been agitated, and it illustrates both cognitive dissonance and confirmation bias mechanisms. As an example, an editorial by the editor-in-chief of the journal *Arthroscopy* was titled “Could the New England Journal of Medicine be biased against arthroscopic knee surgery? Part 2” and included statements such as “patients who may not be of entirely sound mind are selected as research subjects [in placebo-controlled surgical studies], and research performed on such individuals would not be generalizable to mentally healthy patients” (Lubowitz et al. 2014).

There are other possible contributory factors to a lack of implementation of high-level evidence contrary to unquestioned routine. One example is the influence of the organization of the care pathway on procedure rates, where systems can create perverse incentives, with success and remuneration being dependent on volume rather than patient outcome (Hamilton and Howie 2015). Another example is the MR examination early in the care pathway of the middle-aged or older patient with a painful knee showing a meniscus lesion. Demonstrating the presence of such a lesion is bound to increase the likelihood of an arthroscopic procedure, irrespective of the clinical relevance of the lesion.

Available evidence supports the reversal of a common medical practice. It is time to abandon ship.

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- Appel H. Late results after meniscectomy in the knee joint. *Acta Orthop Scand* 1970; Suppl 133.
- Bannuru R R, McAlindon T E, Sullivan M C, Wong J B, Kent D M, Schmid C H. Effectiveness and implications of alternative placebo treatments: a systematic review and network meta-analysis of osteoarthritis trials. *Ann Intern Med* 2015; 163: 365-72.
- Bergkvist D, Dahlberg L E, Neuman P, Englund M. Knee arthroscopies: who gets them, what does the radiologist report, and what does the surgeon find? *Acta Orthop* 2016; 87 (1): 12-16.
- Bohensky M A, Sundararajan V, Andrianopoulos N, de Steiger R N, Bucknill A, Kondogiannis C M, McColl G, Brand C A. Trends in elective knee arthroscopies in a population-based cohort, 2000–2009. *Med J Aust* 2012; 197: 399-403.
- Carr A. Arthroscopic surgery for degenerative knee. Overused, ineffective, and potentially harmful. *BMJ* 2015; 350: h2983.
- Chang R W, Falconer J, Stulberg S D, Arnold W J, Manheim L M, Dyer A R. A randomized, controlled trial of arthroscopic surgery versus closed-needle joint lavage for patients with osteoarthritis of the knee. *Arthritis Rheum* 1993; 36: 289-96.
- Cobb L A, Thomas G I, Dillard D H, Merendo K A, Bruce R A. An evaluation of internal mammary artery ligation by a double-blind technic. *N Engl J Med* 1959; 260: 1115-8.
- Cullen K A, Hall M J, Golosinskiy A. Ambulatory surgery in the United States, 2006. *Natl Health Stat Report* 2009; 11: 1-25.
- Dearing J, Brenkel I J. Incidence of knee arthroscopy in patients over 60 years of age in Scotland. *Surgeon* 2010; 8: 144-50.
- Dervin G F, Stiell I G, Wells G A, Rody K, Grabowski J. Physicians' accuracy and interrater reliability for the diagnosis of unstable meniscal tears in patients having osteoarthritis of the knee. *Can J Surg* 2001; 44: 267-74.
- Englund M, Guermazi A, Gale D, Hunter D J, Aliabadi P, Clancy M, Felson D T. Incidental meniscal findings on knee MRI in middle-aged and elderly persons. *N Engl J Med* 2008; 359: 1108-15.
- Gauffin H, Tagesson S, Meunier A, Magnusson H, Kvist J. Knee arthroscopic surgery is beneficial to middle-aged patients with meniscal symptoms: a prospective, randomised, single-blinded study. *Osteoarthritis Cartilage* 2014; 22: 1808-16.
- Gillquist J, Oretorp N. Arthroscopic partial meniscectomy. *Clin Orthop* 1982; 167: 29-33.
- Guermazi A, Niu J, Hayashi D, Roemer F W, Englund M, Neogi T, Aliabadi P, McLennan C E, Felson D T. Prevalence of abnormalities in knees detected by MRI in adults without knee osteoarthritis: population based observational study (Framingham Osteoarthritis Study). *BMJ* 2012; 345: e5339.
- Hamberg P, Gillquist J. Knee function after arthroscopic meniscectomy. A prospective study. *Acta Orthop Scand* 1984; 55: 172-5.
- Hamilton D F, Howie C R. Knee arthroscopy: influence of systems for delivering healthcare on procedure rates. *BMJ* 2015; 351: h4720.
- Hare K B, Lohmander L S, Kise N J, Risberg M A, Roos E M. Does the meniscal symptom index include the symptoms most important for middle-aged patients with degenerative meniscal tears eligible for surgery? *Osteoarthritis Cartilage* 2014; 22 Suppl: S469.
- Hare K B, Vinter J H, Lohmander L S, Thorlund J B. Large regional differences in incidence of arthroscopic meniscal procedures in the public and private sector in Denmark. *BMJ Open* 2015; 5: e006659.
- Herrlin S, Hallander M, Wange P, Weidenhielm L, Werner S. Arthroscopic or conservative treatment of degenerative medial meniscal tears: a prospective randomised trial. *Knee Surg Sports Traumatol Arthrosc* 2007; 15: 393-401.
- Horton R. Surgical research or comic opera: questions, but few answers. *Lancet* 1996; 347: 984-5.
- Jackson J P. Degenerative changes in the knee after meniscectomy. *Br Med J* 1968; 2: 525-7.
- Katz J N, Brophy R H, Chaisson C E, de Chaves L, Cole B J, Dahm D L, et al. Surgery versus physical therapy for a meniscal tear and osteoarthritis. *N Engl J Med* 2013; 368: 1675-84.
- Kirkley A, Birmingham T B, Litchfield R B, Giffin J R, Willits K R, Wong C J, et al. A randomized trial of arthroscopic surgery for osteoarthritis of the knee. *N Engl J Med* 2008; 359: 1097-107.
- Lazic S, Boughton O, Hing C, Bernard J. Arthroscopic washout for the knee: a procedure in decline. *Knee* 2014; 21: 631-4.
- Lohmander L S, Roos E M. The evidence base for orthopaedics and sports medicine. Scandalously poor in parts. *BMJ* 2015; 350: g7835.
- Lubowitz J H, Provencher M T, Rossi M J. Could the New England Journal of Medicine be biased against arthroscopic knee surgery? Part 2. *Arthroscopy* 2014; 30: 654-5.
- Lysholm J, Gillquist J. Endoscopic meniscectomy - a follow-up study. *Int Orthop* 1981; 5: 265-70.
- Mattila V M, Sihvonen R, Paloneva J, Felländer-Tsai L. Changes in rates of arthroscopy due to degenerative knee disease and traumatic meniscal tears in Finland and Sweden. *Acta Orthop* 2016; 87 (1): 5-11.
- Miller F G, Kallmes D F. The case of vertebroplasty trials. Promoting a culture of evidence-based procedural medicine. *Spine* 2010; 35: 2023-6.
- Moseley J B, O'Malley K, Petersen N J, Menke T J, Brody B A, Kuykendall D H, et al. A controlled trial of arthroscopic surgery for osteoarthritis of the knee. *N Engl J Med* 2002; 347: 81-8.
- Niu N N, Losina E, Martin S D, Wright J, Solomon D H, Katz J N. Development and preliminary validation of a meniscal symptom index. *Arthritis Care Res* 2011; 63: 208-15.
- Northmore-Ball M D, Dandy D J. Longterm results of arthroscopic partial meniscectomy. *Clin Orthop* 1982; 167: 34-42.
- Österås H, Österås B, Torstensen TA. Medical exercise therapy, and not arthroscopic surgery, resulted in decreased depression and anxiety in patients with degenerative meniscus injury. *J Bodyw Mov Ther* 2012; 16: 456-63.
- Roos E M, Lohmander L S. Unga patienter – gamla knän. Knäbesvär i medelåldern är ofta artros. [Young patients--old knees. Knee problems in the middle age often osteoarthritis.] *Läkartidningen* 2009; 106: 1645-8.
- Sihvonen R, Paavola M, Malmivaara A, Itala A, Joukainen A, Nurmi H, et al. Arthroscopic partial meniscectomy versus sham surgery for a degenerative meniscal tear. *N Engl J Med* 2013; 369: 2515-24.
- Thorlund J B, Hare K B, Lohmander L S. Large increase in arthroscopic meniscus surgery of middle-aged and older in Denmark from 2000 to 2011. *Acta Orthop* 2014; 85: 287-92.
- Thorlund J B, Juhl C B, Roos E M, Lohmander L S. Arthroscopic surgery for the degenerative knee: systematic review and meta-analysis of benefits and harms. *BMJ* 2015; 350: h2747.
- Wartolowska K, Judge A, Hopewell S, Collins G S, Dean B J F, Rombach I, et al. Use of placebo controls in the evaluation of surgery: systematic review. *BMJ* 2014; 348: g3253.
- Yim J H, Seon J K, Song E K, Choi J I, Kim M C, Lee K B, et al. A comparative study of meniscectomy and nonoperative treatment for degenerative horizontal tears of the medial meniscus. *Am J Sports Med* 2013; 41: 1565-70.
- Zhang W, Robertson J, Jones A C, Dieppe P A, Doherty M. The placebo effect and its determinants in osteoarthritis: meta-analysis of randomized controlled trials. *Ann Rheum Dis* 2008; 67: 1716-23.