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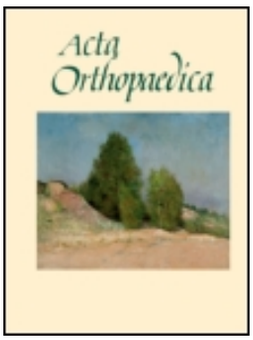

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Knee arthroscopies: who gets them, what does the radiologist report, and what does the surgeon find?

An evaluation from southern Sweden

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Background and purpose — Several randomized controlled trials have not shown any added benefit of arthroscopy over placebo surgery or physiotherapy in middle-aged patients with knee symptoms without trauma. We studied the characteristics of the knee arthroscopies performed in southern Sweden.

Patients and methods — From the orthopedic surgical records from 2007–2009 in the Skåne region of Sweden (with a population of 1.2 million), we retrieved ICD-10 diagnostic codes and selected all 4,096 arthroscopies that were diagnosed peroperatively with code M23.2 (derangement of meniscus due to old tear or injury) or code M17 (knee osteoarthritis). We extracted information on cartilage and meniscus status at arthroscopy, and we also randomly sampled 502 of these patients from the regional archive of radiology and analyzed the preoperative prevalence of radiographic or magnetic resonance imaging (MRI)-defined osteoarthritis.

Results — 2,165 (53%) of the 4,096 arthroscopies had the diagnostic code M23.2 or M17. In this subgroup, 1,375 cases (64%) had typical findings consistent with degenerative meniscal tear (i.e. that correspond to a degenerative meniscal tear in at least a third of *all* arthroscopies). Of the randomly sampled patients, the preoperative prevalence of radiological knee osteoarthritis was 46%.

Interpretation — There is a discrepancy between evidence-based medicine treatment guidelines and clinical practice regarding the amount of knee arthroscopies performed in patients with symptoms of degenerative knee disease.

Knee arthroscopy has become a popular procedure in patients with knee osteoarthritis (OA), to debride menisci and shave the degraded cartilage in order to alleviate knee symptoms. However, knee arthroscopy in subjects with verified radiographic evidence of knee OA has consistently been reported to be no more effective than a sham procedure or exercise therapy (Moseley et al. 2002, Kirkley et al. 2008). The treatment of patients with degenerative meniscal tear with minor evidence of OA has been controversial (Aaron et al. 2006, Spahn et al. 2006, Herrlin et al. 2007, Herrlin et al. 2013). However, a recent double-blind, sham-controlled study did not show any advantage over placebo arthroscopy and arthroscopic partial meniscectomy in medial atraumatic degenerative meniscus tears also in knees without radiographic OA (Sihvonen et al. 2013).

In Denmark, the use of arthroscopy has been reported to be increasing in middle-aged patients (Thorlund et al. 2014), and the topic is highly controversial and much debated (Krogsgaard et al. 2014). Furthermore, it is currently unclear in most countries, including Sweden, what the characteristics of the patients who have actually been undergoing arthroscopy of the knee are, and what the radiological and peroperative findings are. We therefore performed a descriptive epidemiological study in southern Sweden to determine the demographics and characteristics of patients undergoing arthroscopy, concentrating on the degenerate knee.

Patients and methods

Surgical findings

OrtReg is an orthopedic surgical patient record in the Skåne region (with a population of 1.2 million in 2009), the most southern part of Sweden. The information in OrtReg can be retrieved through the patient's personal identification number, which includes the date of birth and information on gender. It contains the surgical report, the surgeons' diagnostic codes according to the International Classification of Diseases

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(ICD) 10, and the procedure codes according to the Swedish version of NOMESCO Classification of Surgical Procedures (KKÅ97). OrtReg includes information on all knee arthroscopies—including cartilage and meniscal status—performed by the major public healthcare providers in the region. All public healthcare providers in the region use Ort Reg to produce the mandatory surgical record that grants financial reimbursement for the surgical procedure. A control system is used to ensure that the surgical records are produced by the surgeon. To our knowledge, there is a very low likelihood of missing records or data. Peroperative findings and diagnoses are registered by the surgeon on a computer in a "click and choose" fashion, where all relevant information must be included to be able to complete the registration. Private clinics are not covered.

Search criteria

From OrtReg, we selected all arthroscopies performed during the calendar years 2007, 2008, and 2009. In addition, we singled out all arthroscopies that were peroperatively diagnosed with ICD-10 code M23.2 (derangement of meniscus due to old tear or injury) and/or M17 (OA of the knee). These surgical records were analyzed in depth by one investigator (DB). We sorted the cases into type of meniscus tear and analyzed age, sex, the location of the tear, anterior cruciate ligament (ACL) status, and cartilage damage in the ipsilateral compartment.

Radiographic and MRI findings

We randomly sampled 25% of the arthroscopies with the diagnostic codes M23.2 or M17 with Mersiene Twister in SPSS software version 17.0. Then, using the computerized regional archive of radiology (Sectra Pacs IDS57), we searched whether weight-bearing radiographic knee examination or knee MRI had been done preoperatively. The same investigator (DB) manually reviewed the radiologist's written statement and classified the weight-bearing knee radiographs. Findings with Kellgren-Lawrence grading 1 or higher was classified as OA or incipient OA. We chose to include Kellgren-Lawrence grade 1 because we also wanted to include early OA, and it has been reported that these patients progress to later stages of OA to a high degree and thus should be regarded as part of a continuum of OA (Hart and Spector 2003).

MRIs of the knee were classified as OA if the radiologist reported: Full joint space narrowing and osteophytes, or 1 of these in combination with 2 of the following features as suggested by Osteoarthritis Research Society International (OARSI) (Hunter et al. 2011):

- bone marrow lesion (not if trauma was present 0–6 months before MRI)
- partial cartilage loss in any sub-region
- degenerated meniscus
- synovitis

Alternatively, it was acceptable if the radiologist had reported "findings compatible with OA".

We then calculated the prevalence of pre-arthroscopic findings of radiographic knee OA and the prevalence of pre-arthroscopic MRI findings compatible with knee OA.

Statistics

For calculation of CI for proportions, we used a formula for 1-sample dicotomous outcome.

Ethics

Lund University ethics review board approved the study (March 18, 2014; reg. no. 2013/700).

Results

Patient demographics and diagnoses

We identified 4,096 arthroscopies (62% in men). There were 97 different peroperative primary diagnoses; however, 53% of all arthroscopies (2,165 cases) had the diagnostic code M23.2 (derangement of meniscus due to old tear or injury) or M17 (OA of the knee). Two-thirds of the codes were M23.2, and most of the meniscal derangements were located in the medial compartment. Mean age at surgery was 43 (SD 14) years in those with the diagnostic code M23.2, and it was 51 (SD 14) years in those with the diagnostic code M17 (Table 1).

The most common procedures in arthroscopy for the 2,165 cases with diagnostic codes M23.2 and M17 were partial excision of meniscus (NGD11; n = 1,677; 77%), synovectomy (NGF11; n = 703; 32%), shaving of cartilage (NGF504; n = 504; 23%), exploration (NGA11; n = 226; 10%), and Pridie drilling/microfracture (NGF91; n = 106; 5%). 42 patients (2%) had their meniscus sutured (NGD21) and they had a mean age of 25 (SD 14) years.

Radiological findings

Of the 2,165 cases with diagnostic codes M23.2 and M17, 502 cases were randomly sampled for radiographic and MRI findings. Their mean age was 45 (SD 14) years. Of these, 395 (79%) had had a weight-bearing knee radiograph and/or a knee MRI examination preoperatively. The prevalence of either radiographic OA or MRI-defined OA was 46% (n = 182; CI: 41–51). The remaining 107 patients (21%) had had a non-weight-bearing knee radiograph or no radiograph at all (Table 2).

Arthroscopy findings

Of those with the diagnoses "derangement of meniscus due to old tear or injury" (M23.2) and "knee OA" (M17), the degenerative/flap/horizontal types of tears represented two-thirds of all meniscus tears. The mean age was 50 (SD 12) years. Medial meniscus tear was more than 3 times as common as lateral meniscus tear, and the posterior horn was the most commonly affected segment. Both compartments had a high percentage of ipsilateral cartilage damage (Table 3).

Table 1. The 24 most frequent peroperative diagnoses of all arthroscopies performed by public healthcare providers in the Skåne region, Sweden, in the period 2007–2009. These are arranged in descending prevalence

ICD-10	Text	n	%	Mean age
M23.2M	Derangement of meniscus due to old tear or injury, medial	1,016	25	44
M17.1	Other primary gonarthrosis	471	12	55
M23.5	Chronic instability of knee	257	6	32
M23.2L	Derangement of meniscus due to old tear or injury, lateral	223	5	38
M23.2	Derangement of meniscus due to old tear or injury	214	5	42
S83.2M	Tear of meniscus, current, medial	158	4	34
M17.3	Other posttraumatic gonarthrosis	158	4	41
M65.9G	Synovitis and tenosynovitis, knee, unspecified	153	4	33
M67.2	Synovial hypertrophy, not specified elsewhere	112	3	29
S83.5	Sprain and strain involving cruciate ligament of knee	85	2	28
M17.5	Other secondary gonarthrosis	83	2	51
M25.5G	Pain in joint, knee	80	2	33
M23.4	Loose body in knee	75	2	35
S83.5R	Sprain and strain involving anterior cruciate ligament of knee	72	2	28
M93.2G	Osteochondritis dissecans, knee	71	2	25
M00.9G	Pyogenic arthritis, unspecified, knee	67	2	55
M79.6G	Pain in limb, knee	65	2	30
S83.2L	Tear of meniscus, current, lateral	65	2	29
S83.0	Dislocation of patella	56	1	20
S83.7	Injury to multiple structures of knee	50	1	31
S83.3M	Tear of articular cartilage of knee, current, medial	50	1	39
M00.0G	Staphylococcal arthritis, knee	46	1	56
M22.2	Patellofemoral disorders	40	1	27
M23.8	Other internal derangements of knee	37	1	31

Table 2. Frequency of patients with the diagnosis "derangement of meniscus due to old tear or injury" (code M23.2) or "knee osteoarthritis" (OA; code M17) examined by knee radiography or magnetic resonance imaging (MRI) and with findings indicating OA

	Random subset with diagnostic code M23.2 or M17, n = 502		
Preoperative imaging modality	n (% of total)	With OA on imaging n (%) [a]	Without OA on imaging n (%) [a]
Weight-bearing radiograph	262 (52)	108 (41)	154 (59)
MRI	248 (49)	107 (44)	141 (56)
Total	395 (79)	182 (46)	213 (54)

[a] Percentages of each imaging modality group.

There were few radial meniscus tears (7% of all tears). The medial radial tears were mainly located in the posterior horn, had a high degree of ipsilateral cartilage damage, and had high mean patient age. The ACL was usually intact. In contrast, the lateral radial tears were mainly located in the body, had lower mean patient age, and more often had a co-existing ACL tear (Table 3).

The patients with longitudinal/bucket-handle tears constituted 25% of all patients with diagnostic codes M23.2 and M17, and had a mean age of 35 (SD 14) years. Almost half of these patients had an ACL injury (Table 3).

Combining all degenerative, horizontal, flap, and medial radial tears (n = 1,375) showed a high proportion of ruptures (64%; CI: 62–66), with findings consistent with degenerative meniscal tear.

Table 3. Frequency (n=1898) and types of meniscal tears and associated findings in patients diagnosed with "derangement of meniscus due to old tear or injury" (code M23.2) or "knee osteoarthritis" (OA; code M17)

	Type of meniscal tear					
	Degenerative/ flap or horizontal		Radial		Bucket-handle/ longitudinal	
	Medial n = 1,002	Lateral n = 294	Medial n = 79	Lateral n = 53	Medial n = 346	Lateral n = 124
Age, mean (SD)	50 (12)	49 (15)	51 (14)	32 (14)	35 (13)	37 (15)
Women, n (%)	339 (34)	124 (42)	18 (23)	14 (26)	102 (29)	51 (41)
Location of tear, n (%)						
posterior horn	796 (79)	87 (30)	59 (75)	6 (11)	181 (52)	79 (64)
body	168 (17)	155 (53)	16 (20)	43 (81)	147 (42)	33 (27)
anterior horn	38 (4)	52 (18)	4 (5)	4 (8)	8 (2)	12 (10)
Any cartilage damage ipsilateral compartment, n (%)	774 (77)	221 (75)	65 (82)	28 (53)	181 (52)	72 (58)
ACL injury, n (%)	139 (14)	61 (21)	6 (8)	19 (36)	154 (45)	35 (28)

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Discussion

We found that half of all arthroscopies performed in the Skåne region (53%) were peroperatively diagnosed as showing old meniscus injury (code M23.2) or OA (code M17). Of these, two thirds of the meniscal tears were classified as degenerative, including flap or horizontal tears. Patients with these lesions had a mean age of 50 years. We also found that the prevalence of radiographic OA and MRI-defined OA was high (half of those examined with weight-bearing knee radiograph or MRI).

Recently published data have indicated an increase in the incidence of arthroscopic meniscal procedures in Denmark between 2000 and 2011, and this increase was mainly reported to be in middle-aged patients. The diagnosis "old meniscus tear" increased 2.7 fold in that time, while the increase in traumatic meniscal tears was only 1.3 fold (Thorlund et al. 2014). This widening of indications is probably partially due to a challenging clinical situation with many patients seeking medical advice for knee complaints, at the same time as meniscal lesions are so prevalent in middle-aged or elderly individuals and are usually associated with OA—and often an incident MRI finding (Englund et al. 2008). This makes it difficult for the clinician to differentiate whether the pain originates from early-stage OA or from the meniscal lesion per se (Englund et al. 2010). Several randomized controlled trials designed to evaluate the effect of arthroscopy on middle-aged patients with knee pain with or without OA have, however, not shown any beneficial effect of surgery over placebo surgery or physiotherapy.(Moseley et al. 2002, Herrlin et al. 2007, Kirkley et al. 2008, Katz and Losina 2013, Sihvonen et al. 2013, Yim et al. 2013). Only 1 study has indicated a slightly better effect of knee arthroscopy with partial meniscectomy than of physiotherapy alone, but this study did not include any sham operation (so a stronger placebo effect in surgery patients cannot be excluded) (Gauffin et al. 2014).

To our knowledge, no previous study have evaluated preoperative radiological and intraoperative findings in this patient category. It appears that a relatively large volume of patients have undergone arthroscopy with little or no scientific evidence of an effect over placebo. In Sweden, a report containing regional statistics (Open comparison, www.skl.se), has suggested a considerable regional discrepancy in the relative number of arthroscopies performed in patients aged over 40 years with diagnostic codes M23.2 and M17—with a low relative frequency in the Skåne region. It is also noteworthy that the proportion of subjects with attempts at meniscal repair is quite low. This finding warrants further investigation regarding whether more repairs can be attempted to potentially save or restore meniscal function in selected patients.

The main strengths of our study were the large number of patients examined and the fact that there were no missing data regarding peroperative findings. The study sheds light on the kinds of patients who underwent arthroscopy within the time frame of our study. There were, however, important limitations. There is no consensus regarding what defines "tear of meniscus current" (code S83.2) rather than "derangement of meniscus due to old tear or injury" (code M23.2). It is therefore possible that some acute/traumatic meniscal injuries are initially treated with exercise therapy and are later defined peroperatively as old meniscus tears. It is also possible that a degenerative meniscal injury was preceded by a minor trauma, and therefore diagnosed as S83.2—and thereby excluded from our study. Moreover, the surgical register through which we identified the patients (OrtReg) reflects only the productivity of the public healthcare providers and covers approximately 90% of all arthroscopies performed in the region, excluding the private healthcare providers.

In conclusion, assuming a "best case" scenario, i.e. that no subjects diagnosed as acute meniscus tear (S82.3) had a degenerative tear, about a third of all arthroscopies performed in the Skåne region of Sweden were performed in patients with a typical degenerative meniscus tear and/or radiographic OA. It is notable that the relative number of arthroscopies in the Skåne region with diagnostic codes M23.2 and M17 is amongst the lowest in Sweden, which warrants concern. This, together with the lack of evidence of additional treatment effect in this patient category, suggests the possibility in Sweden of being more restrictive in the future regarding the use of arthroscopy in middle-aged or older patients with non-traumatic knee pain. Furthermore, the number of sutured menisci was low and there might be a possibility of saving meniscal tissue in the group with longitudinal/bucket-handle tears rather than performing resection.

No competing interests declared.

DB participated in the conception and design of the study, collected data, performed the calculations, and prepared the draft manuscript. LD and ME participated in the conception and design, in interpretation of the findings, and in revision of the draft. PN participated in interpretation of the findings and in revision of the draft.

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