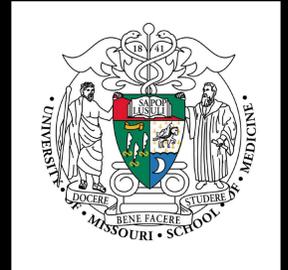




OVERUTILIZATION OF MAGNETIC RESONANCE IMAGING IN THE DIAGNOSIS AND TREATMENT OF MODERATE TO SEVERE OSTEOARTHRITIS



Martin H. Gregory, M2; Nicholas Capito, MD; Tyler Jenkins, M4; Aaron Gray, MD; Sonny Bal, MD, JD, MBA; Seth L. Sherman, MD

Department of Orthopaedic Surgery, University of Missouri; Columbia, MO

Introduction:

Advanced imaging is a major driver of health care expenditures. Magnetic resonance imaging provides advantages over radiography because of its ability to visualize soft tissues within the knee joint. The clinical relevance of these findings in osteoarthritis, however, is not well understood. For example, MRI can detect meniscal tears, but these are frequent findings in patients with osteoarthritis, with no difference in prevalence among those with and without symptoms.¹ In addition to concerns about excessive cost, it is possible that patients may undergo unnecessary procedures due to MRI findings. A randomized placebo-controlled trial showed no benefit of arthroscopy for osteoarthritis.² Our goal was to examine how prevalent this practice is at this institution, and to examine the characteristics of physicians who ordered these MRIs. Our hypothesis is that many providers order MRI for evaluation of osteoarthritis before referring to an orthopedic surgeon, and that providers with higher levels of training are less likely to order these unnecessary MRIs

Materials & Methods:

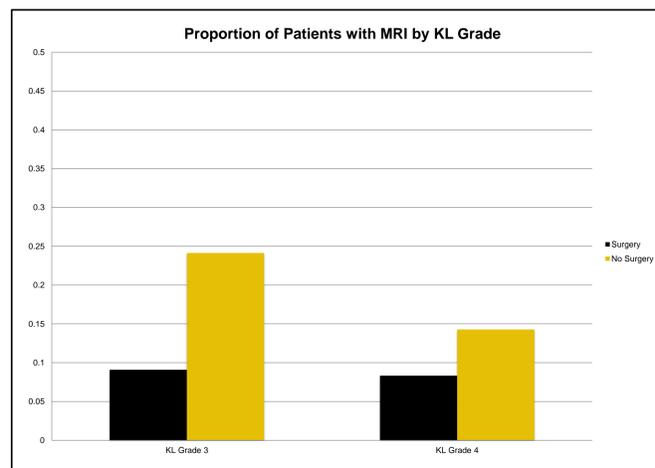
We retrospectively examined the records of consecutive patients referred to one high-volume arthroplasty orthopedic surgeon at our institution over a one year period. All patients with an ICD-9 code for osteoarthritis (715), classified as a new patient were screened were screened initially. Patients with a systemic inflammatory disorder or history of recent trauma were excluded. Patients with previous knee arthroplasty being evaluated for revision surgery were also excluded.

All radiographs were reviewed and graded in severity using the Kellgren-Lawrence (KL) scale. All patient who went on to have total knee arthroplasty were included. Of patients who did not have surgery, those with a KL grade 3 or 4 in any compartment were included in the analysis.

We identified all patients with an MRI performed at an outside institution and those with radiography performed at and outside institution. We calculated the percentage of patients presenting with MRI and/or radiograph.

We attempted to identify the referring provider for all patients. For patients without a referring physician listed, we assumed that the primary care provider listed in the medical record ordered any imaging studies prior to referral to the orthopedic surgeon. For all providers we attempted to identify: 1) the specialty of the referring physician; 2) if they were a university or community physician; 3) whether they had fellowship training; and 4) the distance the referring physician's listed address to our institution.

	Surgery	No Surgery	Overall
Total Number Patients	107	57	164
Patients with outside X-ray	11	5	16
Patients with outside MRI	9	11	20
Prop with outside MRI	0.084	0.193	0.122



	With MRI			Without MRI		
	Surgery	No Surgery	Overall	Surgery	No Surgery	Overall
KL grade 3	0.33	0.31	0.50	0.64	0.48	0.37
KL grade 4	0.67	0.73	0.50	0.36	0.52	0.63
Age	69.38	62.66	65.68	62.61	65.38	63.49
Average distance	66.08	47.67	55.96	57.13	43.58	53.39
Prop MU physician	0.11	0.00	0.09	0.23	0.37*	0.27*
Prop fellowship trained	0.22	0.18	0.20	0.17	0.20	0.18
Physician specialty						
Family Practice	0.56	0.40	0.47	0.65	0.63	0.64
Internal Medicine	0.11	0.10	0.11	0.18	0.26	0.20
Orthopedic Surgery	0.22	0.10	0.16	0.09	0.03	0.07
Other	0.00	0.10	0.05	0.04	0.06	0.05
Non-Physician	0.11	0.30	0.21	0.04	0.03*	0.04*
Unavailable	0	1	1	7	11	18
* Statistically significant						

Results:

- Six 20 out of 164 patients (12.2%) of patients presented with an MRI.
- Of patients who underwent surgery, 8.4% had previous MRI.
- Of patients who did not undergo surgery, 19.3% had previous MRI.
- 16 out of 164 patients (9.7%) of patients presented with radiography.
- A greater proportion of patients with KL grade 3 had presented with MRI compared to those with KL grade 4 (16.1% vs. 10.0%).
- Non-physicians (physician assistants, nurse practitioners) made up a greater proportion of providers who ordered MRIs (21% vs. 4%) than those who did not
- MU physicians made up a higher proportion of referring providers who did not order MRI (27% vs. 9%). There was no difference in the proportion of fellowship-trained physicians among those who did and did not order MRI.

Conclusions:

Overutilization in this specifically defined population was 12.2%, although our results are probably an underestimate. Non-physicians and non-MU physicians were more likely to order unnecessary MRIs. MRI utilization was higher among patients with KL grade 3 and among those who did not undergo surgery, indicating that MRI was used more often in cases of greater clinical uncertainty. Since we only included a very specific population, however, MRI was still unnecessary. Not only does this overutilization represent excess cost, but it can be eliminated without harming patients. Future studies are need to confirm our findings and see if they are consistent across different practice settings.

References:

1. Englund, M., et al., *Incidental Meniscal Findings on Knee MRI in Middle-Aged and Elderly Persons*. New England Journal of Medicine, 2008. **359**(11): p. 1108-1115.
2. Moseley, J.B., et al., *A Controlled Trial of Arthroscopic Surgery for Osteoarthritis of the Knee*. New England Journal of Medicine, 2002. **347**(2): p. 81-88.