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Osteoarthritis imaging: A survey of British Columbian doctors and evidence-based recommendations

Weight-bearing knee X-rays are critical in the diagnosis and management of osteoarthritis. Strategies should be employed to ensure knee X-rays are ordered weight-bearing.

ABSTRACT: Osteoarthritis is a common and debilitating condition that is rapidly increasing in prevalence worldwide, including in British Columbia.¹ Despite evidence dating back to the 1970s expressing the importance of weight-bearing X-rays for imaging knee osteoarthritis, studies have shown that most knee X-rays are ordered non-weight-bearing.^{2,3} A simple four-question survey was administered to family physicians and orthopaedic surgeons throughout BC to assess the imaging practices for osteoarthritis. The surveyed orthopaedic surgeons unanimously responded that weight-bearing knee X-rays are important in the diagnosis of osteoarthritis and that an MRI is not necessary if X-rays reveal moderate osteoarthritis. In comparison, a portion of family physicians did not endorse the importance of weight-bearing X-rays. Based on the results, improved communication and education should be sought among physicians, orthopaedic surgeons, and radiologists.

Background

Osteoarthritis is the most common type of arthritis and a major cause of disability in

the aging population. Over 6 million Canadians have arthritis, which costs the Canadian economy \$33 billion per year.¹ To relieve pain and suffering and get patients back to improved functionality and mobility, early recognition and timely referrals are required to get patients the treatment they require. Correct use of available imaging is crucial. The first step in this process involves primary care providers, who should order weight-bearing X-rays when history and a physical indicate a likely diagnosis of knee osteoarthritis. However, studies have shown that the majority of knee X-rays are non-weight-bearing.^{2,3} A British study found that 98% of nontraumatic knee X-rays ordered by family physicians were non-weight-bearing.² This can result in treatment delays, because supine X-rays have been shown to underestimate the severity of joint space narrowing and often miss the diagnosis of osteoarthritis in mild to moderate cases.^{2,4-7} Additionally, weight-bearing X-rays are better at detecting malalignments such as varus and valgus deformities.⁶ It also increases health care costs and exposes patients to more radiation to have X-rays repeated if not done properly the first time.^{2,3} Moreover, initial supine X-rays may take the practitioner down a wrong diagnosis path, leading to an unnecessary increase in MRI ordering, further delaying treatment.

When compared with arthroscopic findings, a series of weight-bearing X-rays are

adequate for the imaging of osteoarthritis.^{8,9} Although MRI has been shown to be more sensitive for detecting mild osteoarthritis and is debatably better at assessing the progression of disease,^{10,11} research shows that there is no clinically significant indication for MRI in the setting of osteoarthritis.^{3,12,13} Therefore, it is recommended that no MRI be completed when X-rays show moderate or severe osteoarthritis, as it does not change management.¹⁴ Unnecessary MRIs are problematic because of costs to the health care system, delays in referrals and subsequent surgeries, and increased wait times for necessary MRIs.³

Recent commentaries in the *BC Medical Journal* raise concerns about unnecessary musculoskeletal MRIs and incorrect imaging, including non-weight-bearing X-rays for lower extremities, which overload an already tasked system.^{15,16} This study aimed to assess the investigation patterns of BC orthopaedic surgeons and family physicians by administering a simple survey. It was hypothesized that the survey results would demonstrate a discrepancy in imaging practices between family physicians and orthopaedic surgeons.

Methods

Survey

In collaboration with Vancouver Island representatives from the Choosing Wisely campaign, a four-question survey was

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developed. The survey questions were:

1. Is an MRI indicated if moderate hip or knee osteoarthritis is shown on plain X-rays? Yes/No.
2. Are weight-bearing/standing knee X-rays important in the diagnosis of osteoarthritis? Yes/No.
3. Have you read the Choosing Wisely guidelines? Yes/No.
4. What is your field of practice? Family medicine/Orthopaedic surgery.

These questions were selected based on the following Choosing Wisely recommendation: "Don't order a knee MRI when weight-bearing x-rays demonstrate osteoarthritis and symptoms are suggestive of osteoarthritis as the MRI rarely adds useful information to guide diagnosis or treatment."¹⁴ The survey was developed on the Qualtrics platform and distributed using a secure link. The link was distributed to family physicians through local divisions of family practice and directly from local doctors. It was distributed to orthopaedic surgeons through a group email.

Study group

The survey was distributed to family physicians and orthopaedic surgeons throughout BC. A total of 255 responses were recorded: 166 from family physicians, 86 from orthopaedic surgeons, and 3 from individuals who elected not to specify their discipline. The response rate from orthopaedic surgeons was over 50% of the approximately 150 BC surgeons who see or treat patients with lower extremity osteoarthritis. It is more difficult to calculate a response rate for family physicians. The survey link was sent by email to family physicians in one city from each of the four main provincial health authorities. The cities are not identified in this article; a few are quite small and could identify a smaller cohort of family physicians.

Data analysis

The data were analyzed using the integrated statistics platform on Qualtrics called Stats iQ. Fisher exact tests were conducted to determine the association between the different variables.

Results

Based on the statistical analysis, the main findings were as follows:

- A greater percentage of family physicians than orthopaedic surgeons indicated that weight-bearing X-rays are not important in the diagnosis of knee osteoarthritis.
- Of the three respondents who selected that an MRI is indicated when plain X-rays reveal moderate osteoarthritis, all were family physicians and only one had read the Choosing Wisely guidelines.
- A greater percentage of family physicians than orthopaedic surgeons had read the Choosing Wisely guidelines.

For the question "Are weight-bearing/standing knee X-rays important in the diagnosis of osteoarthritis?" 227 respondents selected "Yes" and the remaining 28 selected "No." When relating the responses between family physicians and orthopaedic surgeons, 16.3% of family physicians compared with 0% of orthopaedic surgeons said that weight-bearing knee X-rays are not important in the diagnostic process. The Fisher exact test revealed a *P* value of less than .000001, with effect size of 0.25. Additionally, there was no correlation between respondents who had read the Choosing Wisely guidelines (*P* = 1).

The response for question #2, "Is an MRI indicated if moderate hip or knee osteoarthritis is shown on plain X-rays?" was almost unanimous. Only 3 of 255 respondents selected "Yes." Of those three respondents, all were family physicians and only one had read the Choosing Wisely guidelines. These results were not statistically significant (*P* = .5).

Finally, 36% of respondents indicated that they had read the Choosing Wisely guidelines. When comparing the two disciplines, 26% of orthopaedic surgeons and 43% of family physicians indicated that they had read them. The Fisher exact test revealed a *P* value of less than .01, with effect size of 0.17.

Discussion

The most effective imaging protocol for degenerative joint disease has been a popular research subject over the last 50 years. The earliest study, completed by Ahlback, identified the importance of completing knee X-rays weight-bearing.⁴ Despite the established importance of weight-bearing X-rays, studies have shown that the majority of knee X-rays ordered by family physicians are non-weight-bearing.^{2,3} Local orthopaedic surgeons have indicated that non-weight-bearing knee X-rays are problematic as they result in decreased identification of osteoarthritis, delays in referrals, increased need for repeat X-rays, and an increase in unnecessary MRIs. The survey results indicated a significant discrepancy in the pattern of X-ray ordering between family physicians and orthopaedic surgeons in British Columbia. Orthopaedic surgeons unanimously responded that weight-bearing X-rays are important, compared with 84% of responding family physicians. It is unclear what has contributed to the discrepancy. One reason could be that there is no provincial or federal guideline published for the recommended workup of degenerative knee disease to help practitioners decide which X-ray views to order. Therefore, it is often not until practitioners are referring the patient to an orthopaedic surgeon that they see a recommended series of X-rays. Based on a search of provincial orthopaedic group practices' referral forms, most include recommended X-rays, all of which recommend at least one weight-bearing view of the knee. As a general recommendation, any patient with more than 3 weeks of knee pain should get a series of weight-bearing X-rays, including weight-bearing anterior-posterior, lateral, skyline, and weight-bearing semi-flexed posterior-anterior/notch/tunnel/Rosenberg views, as X-rays are a cost-effective, readily available investigation that is sensitive at detecting most acute, degenerative, and malignant processes.⁷

MRI is a costly investigation that often has long wait times in BC. Despite an almost unanimous response that an MRI is

not indicated if X-rays show moderate hip or knee arthritis, local orthopaedic surgeons still remark that they receive many referrals for patients with previously completed knee or hip MRIs in the context of pre-existing osteoarthritis. Reasons cited for the MRI include persistent pain, mechanical symptoms, and possible avascular necrosis and labral tear. Even if these symptoms are related to internal derangement visible only on MRI, the treatment options and decisions for these patients are unchanged based on these findings.³ Additionally, Bhattacharyya and colleagues have determined that the meniscal tears identified on MRI do not correlate with patients' symptoms.¹³ In the absence of true locking symptoms, studies have looked at using arthroscopic procedures such as debridement and lavage or partial meniscectomy for treatment of knee symptoms in the context of osteoarthritis and have shown no benefits to such interventions.^{17,18} The treatment of advanced osteoarthritis when conservative

management has failed is ultimately a joint replacement, and imaging should, therefore, focus on surgical planning, which requires only weight-bearing X-rays.

Initiatives such as Choosing Wisely (a Canadian initiative) have aimed to reduce unnecessary tests and investigations for many common conditions. The two recommendations relevant to this research are:

- “Don't order a hip MRI when x-rays demonstrate osteoarthritis and symptoms are suggestive of osteoarthritis as the MRI rarely adds useful information to guide diagnosis or treatment.”
- “Don't order a knee MRI when weight-bearing x-rays demonstrate osteoarthritis and symptoms are suggestive of osteoarthritis as the MRI rarely adds useful information to guide diagnosis or treatment.”¹⁴

Based on the study results, having read the Choosing Wisely guidelines was not correlated with a change in responses to either question. Further studies could be completed on intervention effectiveness and ways to clarify messaging, such as the implicit but not explicitly stated recommendation for weight-bearing knee X-rays.

Acknowledging that weight-bearing knee X-rays are likely a standard of practice for many practitioners, the following are possible changes that could increase awareness of imaging best practices. Some practitioners may already have knee X-rays programmed to be ordered weight-bearing on their EMR, but future interventions could include creating an osteoarthritis-specific option for X-ray requisitions on the EMR that would automatically order the appropriate weight-bearing views. Additionally, an easily searchable provincial guideline for suggested imaging for chronic knee pain would help provide further guidance for practitioners.

Conclusions

Osteoarthritis is a prevalent and increasing burden of disability on BC's aging population. Correct imaging is important to guide management of patients and avoid overloading an already taxed system. For our

simple survey, significantly more orthopaedic surgeons than family physicians in BC responded that weight-bearing knee X-rays are important for the diagnosis of osteoarthritis. Although this is already a standard of practice for many practitioners, strategies should be employed to ensure knee X-rays are ordered weight-bearing in the future to increase the sensitivity of diagnosis, reduce repeated X-rays, reduce patient suffering, and reduce the number of wasteful MRIs.

Limitations

The author acknowledges responder bias in this research, as respondents who engage in research are more likely to have read recent recommendations. Additionally, the response rate was lower in family physicians due to limitations in the distribution of the survey. Therefore, responses may not be an accurate representation of the general physician population. Finally, question #1 regarding knee and hip MRIs specified moderate arthritis in accordance with the BC Guideline *Appropriate Imaging for Common Situations in Primary and Emergency Care*: “In the absence of red flags, acute or chronic hip or knee pain with plain film x-ray evidence of moderate to severe osteoarthritis (OA) does not require MRI.”¹⁹ Responses could have differed if the question had been phrased differently. ■

Competing interests

None declared.

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