

Treatment of Osteoarthritis of the Knee (Nonarthroplasty)

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Abstract

The clinical practice guideline was explicitly developed to include only treatments less invasive than knee replacement (ie, arthroplasty). Patients with symptomatic osteoarthritis of the knee are to be encouraged to participate in self-management educational programs and to engage in self-care, as well as to lose weight and engage in exercise and quadriceps strengthening. The guideline recommends taping for short-term relief of pain as well as analgesics and intra-articular corticosteroids, but not glucosamine and/or chondroitin. Patients need not undergo needle lavage or arthroscopy with débridement or lavage. Patients may consider partial meniscectomy or loose body removal or realignment osteotomy, as conditions warrant. Use of a free-floating interpositional device should not be considered for symptomatic unicompartmental osteoarthritis of the knee. Lateral heel wedges should not be prescribed for patients with symptomatic medial compartmental osteoarthritis of the knee.

The work group was unable either to recommend or not recommend the use of braces with either valgus- or varus-directing forces for patients with medial unicompartmental osteoarthritis; the use of acupuncture or of hyaluronic acid; or osteotomy of the tibial tubercle for isolated symptomatic patellofemoral osteoarthritis.

Overview and Rationale

The clinical practice guideline was approved by the American Academy of Orthopaedic Surgeons (AAOS) on December 6, 2008. It is based on a systematic review of published studies on the treatment of osteoarthritis (OA) of the knee in adults. The guideline was explicitly developed to include only treatments less invasive than knee replacement (ie, arthroplasty). In addition to providing practice recommendations, the guideline highlights gaps in the literature and areas that require future research.

The purpose of the clinical practice guideline is to help improve treat-

ment based on current best evidence. Current evidence-based practice standards demand that physicians use the best available evidence in their clinical decision making. To assist physicians, the guideline consists of a series of systematic reviews of the available literature on the treatment of OA of the knee in adults. These systematic reviews were conducted between October 24, 2007, and February 22, 2008; they identify areas of good evidence, show where evidence is lacking, and indicate topics that future research must target to improve treatment. AAOS staff and the Osteoarthritis of the Knee work group systematically reviewed the available literature and subse-

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quently wrote the recommendations based on a rigorous, standardized process.

Musculoskeletal care is provided in many different settings by many different providers. We created the guideline as an educational tool to guide qualified physicians through a series of treatment decisions in an effort to improve the quality and efficiency of care. The guideline should not be construed as including all proper methods of care or as excluding methods of care reasonably directed toward obtaining the same results. The ultimate judgment regarding any specific procedure or treatment must be made in light of all circumstances presented by the patient as well as the needs and resources particular to the locality or institution.

The clinical practice guideline resulted in 22 specific recommendations in 8 separate categories: lifestyle modifications, rehabilitation, mechanical interventions, alternative therapies, pain relievers, intra-articular injections, needle lavage, and surgery. Each recommendation is graded based on the total body of evidence available to recommend for or against the intervention, using the following system:

A: Good evidence (consistent level I studies).

B: Fair evidence (consistent level II and III studies).

C: Poor-quality evidence (level IV or V).

Inconclusive: When there is insufficient or conflicting evidence.

Each recommendation was constructed using the following lan-

guage, which takes into account the final grade of recommendation: recommended, A; suggested, B; option, C; neither recommended nor not recommended, Inconclusive.

Potential Harms and Contraindications

Individuals with OA of the knee often report joint pain, stiffness, and functional deficits. The goals of treatment are pain relief and improvement or maintenance of functional status. Long-term results were often not available, and adverse events varied by study (frequently they were not reported) in the literature available for the guideline. Most treatments are associated with some known risks, especially invasive and

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surgical treatments. In addition, contraindications vary widely based on the treatment administered. Therefore, discussion of available treatments and procedures applicable to the individual patient rely on mutual communication between the patient and physician, weighing the potential risks and benefits for that patient.

Methods

The methods used to develop the clinical practice guideline were designed to combat bias, enhance transparency, and promote reproducibility. Their purpose is both to give interested readers the ability to inspect all of the information the work group used to reach all of its decisions and to verify that these decisions are in accord with the best available evidence. The draft of the guideline was subject to peer review and public commentary. It was approved by the AAOS Evidence-Based Practice Committee, Guidelines and Technology Committee, Council on Research, Quality Assessment and Technology, and the Board of Directors. The methods used to prepare the guideline are detailed in the full clinical practice guideline, which is available at <http://www.aaos.org/research/guidelines/OAKguideline.pdf>.

Beyond the processes employed by the work group and the AAOS Guideline Unit in our own systematic review of the literature, the work group, to address certain questions, decided to utilize the evidence report "Treatment of Primary and Secondary Osteoarthritis of the Knee," prepared for the Agency for Healthcare Quality and Research (AHRQ),¹ and the previously published Osteoarthritis Research Society International (OARSI) treatment guidelines,^{2,3} available at www.oarsi.org.

Recommendations

Recommendation 1

We suggest that patients with symptomatic OA of the knee be encouraged to participate in self-management educational programs, such as those conducted by the Arthritis Foundation, and incorporate activity modifications (eg, walking instead of running, alternative activities) into their lifestyle.

Level of Evidence: II

Grade of Recommendation: B

The OARSI guidelines, on which this recommendation is based, provide evidence from a single meta-analysis about the effect of education and self-management techniques (including changes in activity, exercise, and lifestyle modification) on patients with symptomatic OA of the knee.^{2,3} Self-management results in a statistically significant improvement in pain, although the clinical importance of this improvement cannot be determined. The effect is not large, but it is possible that, with such pain improvement distributed throughout a population, many patients might be shown to benefit from self-management. Additionally, self-management is low in cost and has few associated harms. OARSI also reports that it was not possible to assess which specific aspects of self-management programs were the most effective,³ thus making recommendation of a specific program difficult.

Recommendation 2

Regular contact to promote self-care is an option for patients with symptomatic OA of the knee.

Level of Evidence: IV

Grade of Recommendation: C

The OARSI guidelines provide evidence from a single randomized controlled trial (RCT) about the regular contact of patients with symptomatic OA of the knee.^{2,3} The AAOS work group initially considered the RCT evidence as being of a higher level

but downgraded the evidence to level IV because the results that are relevant to this recommendation are from a post hoc subgroup analysis. The results of this subgroup analysis suggest that regular telephone contact significantly reduces the amount of pain experienced by patients.^{2,3} The evidence from OARSI suggests that this contact could be from lay personnel. Self-care is not defined in the OARSI document. The clinical significance of this finding cannot be determined because the minimally clinically important improvement (MCII) for the Arthritis Impact Measurement Scale (AIMS) instrument is unknown. The fact that telephone contact is of relatively low cost and has minimal, if any, associated harms supports this recommendation.

Recommendation 3

We recommend that patients with symptomatic OA of the knee who are overweight (BMI >25) should be encouraged to lose weight (a minimum of 5% of body weight) and maintain their weight at a lower level with an appropriate program of dietary modification and exercise.

Level of Evidence: I

Grade of Recommendation: A

The OARSI guidelines provide evidence from two RCTs and a recent systematic review regarding the role of weight loss in patients with symptomatic OA of the knee.^{2,3} This evidence was evaluated as level I because the relevant studies were considered to be high-quality, well-designed RCTs. Supporting this recommendation is that weight loss results in a possibly clinically important and statistically significant effect for functional improvement measured by the Western Ontario and McMaster Universities (WOMAC) function subscale (0.69; 95% CI, 0.24, 1.14; MCII = 0.37).^{2,3} The effects of weight loss on other relevant outcomes are less clear. However, the ef-

fect of weight loss on functional improvement, combined with the fact that weight loss is likely to have health benefits that extend beyond OA of the knee, argues for this recommendation.

Recommendation 4

We recommend that patients with symptomatic OA of the knee be encouraged to participate in low-impact aerobic fitness exercises.

Level of Evidence: I

Grade of Recommendation: A

The OARSI guidelines provide evidence from a systematic review that included 13 RCTs on aerobic exercises (eg, walking, cycling) in patients with OA of the knee.^{2,3} This recommendation was addressed by a systematic review of well-designed RCTs, making the evidence level I. The effect size of aerobic exercises on pain relief (0.52; 95% CI, 0.34, 0.70) and disability (0.46; 95% CI, 0.25, 0.67)^{2,3} are statistically significant. Although the clinical importance of these effects cannot be determined, the relatively low cost and likely additional health benefits support this recommendation.

Recommendation 5

Range-of-motion/flexibility exercises are an option for patients with symptomatic OA of the knee.

Level of Evidence: V

Grade of Recommendation: C

Individuals with OA of the knee often suffer from joint stiffness and may have loss of joint motion and limited muscle flexibility. We found no published studies that address the effects of motion/flexibility exercises in patients with OA of the knee. Therefore, this recommendation is based on expert opinion, which is level V evidence. The consensus of the work group is that range-of-motion and flexibility exercises are an option to address these impairments. The low cost of these exercises,

the limited harms associated with them, and their potential benefits warrant this recommendation.

Recommendation 6

We suggest quadriceps strengthening for patients with symptomatic OA of the knee.

Level of Evidence: II

Grade of Recommendation: B

This recommendation was addressed by one level II systematic review⁴ that included nine RCTs that examined the effects of quadriceps strengthening on pain⁵⁻¹³ and no RCTs that examined the effect of quadriceps strengthening on function.⁵⁻¹⁴ The systematic review concludes that quadriceps strengthening is effective. We supplemented the systematic review by performing our own meta-analyses. These analyses included an RCT¹⁵ not included in the systematic review.

The evidence is level II because not all of the included RCTs were high-quality, well-designed trials. The systematic review⁴ that addressed this recommendation contained a meta-analysis that found that the effects of quadriceps strengthening on pain and function were statistically significant. The major shortcoming of this analysis is that it combined studies that measured pain and function in different ways, thus making it impossible to determine whether the effects were clinically important. The results of our own meta-analysis on pain and function suggest a statistically significant and possibly clinically important effect. In light of this, and in light of the lack of harms associated with quadriceps strengthening, the evidence is sufficient to suggest the use of quadriceps strengthening.

Recommendation 7

We suggest that patients with symptomatic OA of the knee use patellar taping for short-term relief of pain

and improvement in function.

Level of Evidence: II

Grade of Recommendation: B

This recommendation of grade B is addressed by one level II systematic review¹⁶ that examined the use of patellar taping among patients with symptomatic OA of the knee. The review included one level I RCT¹⁷ and two level II RCTs.^{18,19} The RCTs in the systematic review report statistically significant and possibly clinically important effects of medial taping on pain (as measured by the visual analogue scale) immediately and 4 days after the start of taping. There is some evidence that medial taping reduces pain on movement by an amount that is possibly clinically important, but this effect is observed only when taping is compared with no taping, not when medial taping is compared with a sham.

Recommendation 8

We suggest that lateral heel wedges not be prescribed for patients with symptomatic medial compartmental OA of the knee.

Level of Evidence: II

Grade of Recommendation: B

This recommendation is addressed by one level II systematic review²⁰ of three level II RCTs that examined the use of lateral heel wedges among patients with symptomatic medial compartmental OA of the knee. The three level II RCTs were published in six separate articles.²¹⁻²⁶ Comparisons between lateral and neutral heel wedges are investigated, as are comparisons between lateral wedged insoles and lateral wedged insoles with subtalar strapping. The systematic review concludes that there is only limited evidence for the effectiveness of lateral heel wedges and related orthoses. In addition, the possibility exists that those who do not use them may experience fewer symptoms from OA of the knee.

Recommendation 9

We are unable to make a recommendation for or against the use of a brace with a valgus-directing force for patients with medial unicompartmental OA of the knee.

Level of Evidence: II

Grade of Recommendation: Inconclusive

This recommendation of Inconclusive is addressed by one level II systematic review²⁰ of two RCTs^{27,28} that examined the use of braces among patients with medial unicompartmental OA of the knee. The brace is applied with the intent of altering a varus malaligned knee by moving the alignment of the knee in a valgus direction. One of the RCTs²⁸ included in the systematic review presented insufficient quantitative data for analyses. The qualitative results reported by the systematic review (for the study that did not adequately report quantitative data) indicate that patients in the brace group improved more on each outcome than did patients who received either a neoprene sleeve or were in the control group. The systematic review concludes that there is only limited evidence for the effectiveness of knee braces.

Recommendation 10

We are unable to make a recommendation for or against the use of a brace with a varus-directing force for patients with lateral unicompartmental OA of the knee.

Level of Evidence: V

Grade of Recommendation: Inconclusive

A knee brace applied with the intent of altering a valgus malaligned knee by moving the alignment of the knee in a varus direction has been proposed as a treatment of individuals with symptomatic lateral tibiofemoral OA of the knee. No studies were identified by our systematic re-

view processes specific to patients with lateral tibiofemoral OA of the knee. Because of the absence of studies to address this treatment, this recommendation is level V.

Recommendation 11

We are unable to make a recommendation for or against the use of acupuncture as an adjunctive therapy for pain in patients with symptomatic OA of the knee.

Level of Evidence: I

Grade of Recommendation: Inconclusive

This recommendation is addressed by the OARSI guidelines and by six level I and eight level II RCTs. The OARSI guidelines report conflicting evidence from two RCTs and one systematic review regarding the symptomatic benefit of acupuncture in patients with OA of the knee.^{2,3} One RCT²⁹ and the systematic review³⁰ support the use of acupuncture; one RCT³¹ does not. In an attempt to resolve these conflicting results, we conducted a de novo systematic review of previously published systematic reviews and confirmed that their conclusions were conflicting. Consequently, we updated these reviews with our own, including performing a meta-analysis of the results of all eligible RCTs on the use of acupuncture in patients with symptomatic OA of the knee.

Our meta-analysis suggests that the reported effects of acupuncture on pain depend on study design and conduct. Accordingly, the largest effects on pain and function are found in studies that did not employ blinding; the smallest effects are found in studies that employed blinding and verified that patients were blinded; and intermediate effects are found in studies that employed blinding but did not verify that patients were blinded. Further analyses showed that the effects of acupuncture on

pain and function were not statistically significant in studies that verified that their patients were blinded. However, there remains a large amount of unexplained variance in this group of studies as well as in the other two groups. Thus, although our meta-analytic results suggest that the apparent effects of acupuncture are to the result of a placebo effect, the unexplained differences among study results do not conclusively prove this point. Because of this, and because of the conflicting conclusions of previously published systematic reviews, we agreed that currently available evidence about the benefits of acupuncture is inconclusive.

Recommendation 12

We recommend that glucosamine and/or chondroitin sulfate or hydrochloride not be prescribed for patients with symptomatic OA of the knee.

Level of Evidence: I

Grade of Recommendation: A

This recommendation is based on an AHRQ report that provides evidence from one RCT and six systematic reviews on the use of glucosamine and/or chondroitin sulfate or hydrochloride among patients with symptomatic OA of the knee.¹ We evaluated this evidence as level I. The AHRQ report states that "the best available evidence found that glucosamine hydrochloride, chondroitin sulfate, or their combination did not have any clinical benefit in patients with primary OA of the knee."¹ One of the six systematic reviews concluded no clinical benefit for glucosamine or chondroitin compared with placebo. The remaining five systematic reviews did not provide conclusions on the clinical importance; however, they did conclude glucosamine and/or chondroitin are superior to placebo. The AAOS work group agreed that the AHRQ

