Evidence in Action

My Patient Has Recurrent Knee Pain—How can I prevent future episodes?

By Michael Tunning, DC, ATC, and Robert Vining, DC

A young woman comes to your chiropractic practice with a complaint of anterior knee pain.

As spring weather returns, patient activity levels often increase. A sedentary lifestyle through the winter months may now be replaced with jogging, biking, hiking, or other outdoor activities. Anterior knee pain can result from this sudden increase in activity levels.[1] This may affect 1 in 4 active individuals and accounts for 25 to 40 percent of all knee problems presenting to sports medicine clinics.[1] Our hypothetical patient is a 24-year-old female who has decided to once again join her friends and run a half-marathon in a fundraising event. She restarted a running program and is experiencing a dull ache at the anterior knee. She has sought care periodically for the same symptoms during the past few years. Her pain has progressed in the past week to bother her mildly while walking up the stairs to her office. She has also noticed mild stiffness while walking at the end of the day. She doesn't want to stop training because she fears she will lose ground with her exercise program. She doesn't feel that the pain is too debilitating yet, and is seeking your advice and care. She asks if she can incorporate into her program therapeutic exercise aimed at reducing pain and preventing her condition from worsening.

The Condition History

Several terms are used to describe anterior knee pain (AKP). The terms "patellofemoral syndrome," "chondromalacia patella," "intra-articular patellar chondropathy," "patellar arthralgia," "runner's knee," and "jumper's knee" are probably familiar to you.[2] It is considered a repetitive-use injury with a relatively consistent presentation, though varied etiology.[2] The pain is typically described as a vague ache that increases with squatting, running, using stairs, downhill running, long-term sitting, and kneeling. You know that this patient was previously inactive and now that her training schedule has started, her pain begins at mile 3. She experiences mild pain and discomfort when using stairs and mild knee stiffness at day's end.

The Physical Examination

You carefully listen to your patient and perform an examination. You note tenderness around the patella fat pad and articular surfaces. The patellar grinding test causes moderate pain. Increased valgus movement of the affected knee is noted during squatting, and your patient has more difficulty with balance while bearing weight on the affected side. You observe the positioning of the patella and inspect for asymmetry. You may evaluate the alignment of the lower extremity including genu valgus/varus and pronation or supination. You may also assess the lower-extremity musculature including the quadriceps muscles for abnormal hypertrophy or lack of tone, and perform dynamic activities to demonstrate positions or movements that cause pain or otherwise indicate muscular dysfunction. Assessing these areas should help you identify the influence that individual muscles and anatomy have on the patella and develop a strategy to restore function.[2] Of course, examination to rule out other conditions such as ligamentous injury, loose bodies, meniscal damage, and referred pain from remote sources should be performed.

So, where do you begin with this patient?

You discover that the *American Journal of Sports Medicine* has an interesting article about an exercise program that appeared to prevent anterior knee pain (AKP) in United Kingdom army recruits during an intense 14 week training program: Coppack RJ, Etherington J, Wills AK. "The Effects of Exercise for the Prevention of Overuse Anterior Knee Pain."

Can you use this study to help your patient?

While skimming the abstract, it seems apparent that this intervention (an exercise prevention program) will help your patient. However, before utilizing the article as a basis for recommendation, you decide to look at it more closely. Critical appraisal is an important aspect of using evidence appropriately. Fortunately, you recently learned some important tips while attending a continuing education class. For instance, the general strength of a conclusion increases when an intervention is easily reproduced, personnel are blinded, and results positively affect patients in a manner that makes the intervention worthwhile. Is the intervention in the article worth implementing for your patient?

A closer look at critical appraisal

Methods: This study utilized a single-blinded cluster randomized design. In other words, clusters (or groups) of participants are assigned a single intervention together. The groups, rather than individuals, are randomly assigned. This was probably the most practical method because of the way recruits are divided into units that train together, sharing the same physical activities. Blinding recruits was attempted but proved unfeasible, leaving the physicians diagnosing acute knee pain as the only blinded study personnel.

Army Physical Training Instructors (PTIs) were taught to personally oversee the standardized sequence of 8 exercises (4 stretches and 4 active contraction exercises). They were provided with written instructions prior to participating in the study. The exercises occurred in subsets of 4 at both the warm-ups and warm-downs of every formal physical training session. The number of repetitions increased during the 14 week timeframe. The control group(s) performed standard exercises consisting of slow running, abdominal curls, pushups and general upper- and lower-body stretching of the same duration. Both groups spent the same amount of time in their respective training programs.

Recruits were classified as developing anterior knee pain if they reported to the army medical center and were subsequently diagnosed with AKP by physicians with specific training. Diagnosis was based on criteria including: "1) anterior or retropatellar knee pain arising from at least two of the following: prolonged sitting, stair climbing, squatting, running, kneeling, and hopping/jumping; 2) insidious onset of symptoms unrelated to a traumatic incident; and 3) presence of pain on palpation of the patellar facets, on step down from a 25-cm step, or during a double-legged squat." Recruits were not diagnosed with AKP if they exhibited "intra-articular pathologic conditions; ligament laxity or tenderness; tenderness over the patellar tendon, iliotibial band, or pes anserinus tendons; patellar apprehension sign; Osgood-Schlatter or Sinding-Larsen-Johanssen syndrome" (chronic traction injury at the proximal patellar tendon)," "evidence of a knee-joint effusion or hip or lumbar referred pain; a history of patellar dislocation; or other surgery or structural damage to the knee."

Results: The investigators calculated a 75 percent risk reduction for developing AKP over the 14-week training

program in the exercise intervention group. Recruits who developed AKP in the intervention group were more likely to experience a successful outcome after diagnosis.

Conclusion: Based on the strength of their results, the authors concluded that this exercise program "significantly reduced the incidence of AKP." They recommended this program for adoption by the British army.

Strengths: The study was conducted in a military recruit training setting where two relatively equal groups were engaged in the same physical activities for 14 weeks. This eliminates several factors that potentially skew results. The participants in both groups were supervised daily in the correct performance of their exercises, which helped to ensure consistency and proper technique.

Limitations: Control-group recruits were not blinded and in 33 percent of diagnosed cases, the physician reported knowledge of the intervention group. This limitation can be significant. The authors acknowledged that this can result in "an overestimation of effect by up to 17 percent."[3] Because cases of AKP were counted only after diagnosis, which required recruits to present to the army medical clinic, it is unknown how many recruits developed AKP, but failed to report. Therefore, it is plausible that the actual risk reduction (reported at 75 percent) is smaller. Males outnumbered females by more than 2:1, and even though the authors reported no sex difference relative to AKP incidence, the reported risk reduction is based on the entire population (mostly male). Finally, the cause or predisposition for AKP was not explored; meaning the effectiveness of preventing specific AKP conditions in patients with known predisposing factors is unknown.

Despite the limitations of this study, the exercise program demonstrated a preventive effect on the development of AKP. The authors stated that careful supervision is probably critical to the success of this program, and cite an unsuccessful study performing similar, less-supervised exercises.[4] You will have to consider the feasibility of incorporating supervision into your recommendations.

Are the findings applicable to your patient?

Extrapolating from the success of this prevention program to your patient should be undertaken with caution because, as the authors state, "We do not know if our results can be generalized to other age groups or to groups with different activity levels."[1] For example, it is unlikely that military recruits wear the same footwear as your patient while exercising, and military recruit activity levels prior to and during a training program may not be the same, either.[5]

You may wish to find out more about the diagnosis of AKP. A quick search on PubMed using the terms "patellofemoral,""syndrome," and "classification," may lead you to an article by Witvrouw that offers an evaluation and classification system for AKP.[2] While Witvrouw's article may not directly help you decide whether to recommend the preventive exercise program, it can provide you with a standard and thorough method of assessing and classifying patients.

What is your decision?

By carefully considering your systematic clinical evaluation, the applicability of study findings, your experience and your patient's goals/preferences, you and your patient can make a well-informed decision regarding treatment and prevention. Perhaps you will decide to recommend another course of care. On the other hand, because there was no evidence that the exercises aggravated AKP and the potential benefit

of utilizing the program is prevention and/or symptom reduction, you may decide on a carefully supervised trial recommendation. The carefully considered, well-informed choice can be made between you and your patient. ■

Michael Tunning, DC, ATC, is an instructor in the Diagnosis and Radiology Department at Palmer College of Chiropractic, Davenport Iowa.

Robert Vining, DC, is an assistant professor and senior research clinician at the Palmer Center for Chiropractic Research, Palmer College of Chiropractic, Davenport, Iowa.

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