Lesions Predict Future Knee OA With Exercise

BY KATE JOHNSON

MONTREAL — The presence of bone marrow lesions in pain-free knees may be a marker for an increased risk of future osteoarthritis among people who participate in vigorous activity. However, it's not known whether a modified exercise program could reduce this risk, said Dr. Anita Wluka at the World Congress on Osteoarthritis.

"It's possible that we should be changing our recommendations from weight-bearing to non–weight-bearing physical activity in this group, but this warrants further investigation," said Dr. Wluka of Monash University in Clayton, Victoria, Australia.

Dr. Wluka's findings were based on a subgroup analysis of people participating in the longitudinal Melbourne Collaborative Cohort (MCC) study, established in 1990 to assess the role of diet and lifestyle in the risk for cancer and diabetes. The original cohort included 41,500 people (aged 40-69 years). In 2002, the investigators expanded the outcomes of interest to include cardiovascular disease and metabolic syndrome.

In a subanalysis, her group identified 271 individuals (aged 50-79 years) who had no knee disease or pain at baseline and results from two magnetic resonance imaging scans taken 2 years apart. Both cartilage volume and defects, as well as the presence of bone marrow lesions (BMLs), were assessed on MRI.

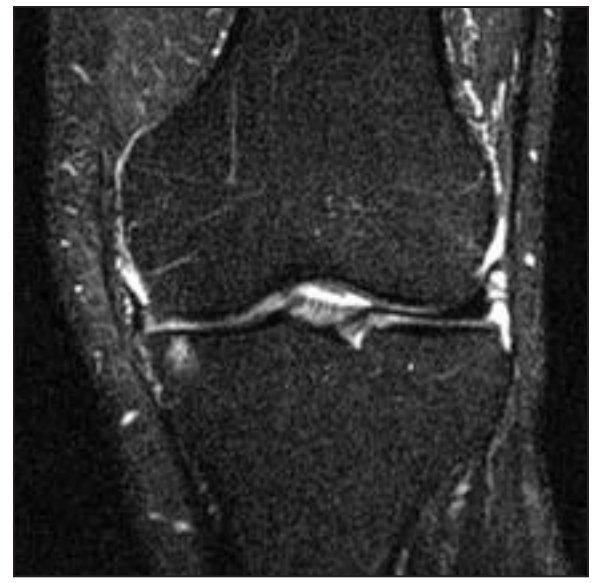
Degree of participation in vigorous physical activity was recorded when subjects first entered the larger MCC study (1990-1994), and again around the time of the first MRI (2004).

Overall, the worsening of cartilage loss and defects was similar among all subjects from the first to the second MRI, regardless of their level of exercise, she said.

"These were not people who ran marathons. These were people who jogged, or danced, or played tennis for more than 20 minutes—enough to raise a sweat or become short of breath."

However, when the cohort was divided according to the presence (37 subjects) or absence (234 subjects) of BMLs on MRI, the risk of medical knee cartilage defects and volume loss was much more pronounced among exercisers, compared with nonexercisers (odds ratio, 3.4).

"This study identifies a subgroup—those with BML—who are more likely to have adverse outcomes with exercise," she concluded. "It may be that the biomechanical properties of bones with BML are altered, and this alters the ability of cartilage to withstand normal or abnormal loading related to physical activity."



COURTESY DR. ANITA WLUKA

Patients with bone marrow lesions, as shown above on MRI, had adverse outcomes with exercise.

Dr. Wluka said her group chose to look at BMLs because they have been associated with pain and progression in patients with symptomatic OA. Even in clinically asymptomatic populations, BMLs have been associated with an increased prevalence of cartilage defects and loss, she said.

"I'm not suggesting everyone go out and get an MRI to see if they have BMLs, but looking at why people have BMLs might be helpful, and there might be noninvasive ways of identifying them," she said in an interview.

The congress was sponsored by the Osteoarthritis Research Society International.

Dr. Wluka said she had no conflicts of interest. ■

EXPERT COMMENTARY

Posttraumatic OA Yields Best Chance for Prevention

Although little progress has been made in the prevention of osteoarthritis overall, the prevention of posttraumatic osteoarthritis might soon be within our grasp.

We are now beginning to realize that this form of osteoarthritis (OA) is much more common than we previously thought, with our best epidemiologic evidence currently suggesting that about one-third of OA may actually be generated by joint injuries (Am. J. Sports Med. 2007;35:1756-69).

BY STEFAN LOHMANDER, M.D., PH.D.

The most common traumatic joint injury is to the knee, specifically the anterior cruciate ligament (ACL). Approximations of annual population incidence suggest that at least 250,000 of these injuries are diagnosed in the United States every year. The incidence of knee meniscus lesions is many times higher. The significant cumulative lifetime risk of these injuries is reflected by their common occurrence in unselected population samples (Scand. J. Sci. Med. Sports 2007;17:109-14).

Most patients with acute ACL tears are younger than 30 years at the time of injury, and many of them are younger than 20 years. Multiple reports show that 10-20 years after their ACL or meniscus tear, every second patient has OA, often with significant pain, functional limitations, and diminished quality of life (Arthritis Rheum. 2004;50:3145-52; Ann. Rheum. Dis. 2004;63:269-73; Am. J. Sports Med. 2007;35;1756-69; Br. J. Sports Med. 2005;39:127-31).

These estimates illustrate the magnitude of our problem: young patients with old knees. What makes this cause of osteoarthritis all the more important is that is that these patients are 20-30 years younger than the average osteoarthritis patient (Am. J. Sports Med. 2007;35;1756-69).

Getting a handle on this large proportion of osteoarthritic patients could significantly lighten the overall disease burden of OA. In fact, at this time, posttraumatic osteoarthritis is perhaps the form of OA that might be the most fruitful to address with our present tools. Importantly, and in contrast to most other forms of osteoarthritis, we can identify individuals at risk for posttraumatic OA soon after the injurious event to the joint, when there might be an opportunity for preventive treatment.

So what can be done, when a young joint is injured, to prevent the development of posttraumatic osteoarthritis down the road? New understanding about the pathological processes that are triggered immediately following a traumatic joint injury has raised interest in the development of interventions that could be used as early as the scene of the accident, or in the days following the injury.

Following an ACL injury, there is evidence of cartilage matrix disruption, chondrocyte death, accelerated chondrocyte senescence, and changes in cell metabolism (Clin. Orthop. Relat. Res. 2002;402:21-37; Biorheology 2004;41:479-91; Am. J. Sports Med. 2006;34:2006-12).

In addition, interaction of the chondrocytes with synovial cells will enhance the negative effects on joint (Arthritis Rheum. 2003;48:1292-301; J. Orthop. Res. 2006;24:684-9; Arthritis Rheum. 1999;42:1033-9).

Acute and sustained increase in the release of matrix molecular fragments, proteases, and cytokines from joint cartilage and other joint tissues within hours and days of the injury results in a rapid onset of damage to the type II collagen network, aggrecan, and other critical matrix components of the joint cartilage, leading to a weakened molecular network of the cartilage matrix (J. Clin. Invest. 1995;96:2859-69; Arthritis Rheum. 2003;48:3130-9; 1999;42:534-44).

We have good evidence to suggest that we may be able to prevent some of the acute effects of injury by either decreasing or inhibiting the cascade of pathological processes that are initiated at the time of injury.

For example, in a rabbit model there is early evidence that the use of enzyme inhibitors might decrease joint cartilage cell death following trauma, and that they might also prevent the loss of important molecular components within the cartilage (Arthritis Rheum. 2006;54:1814-21).

At the recent World Congress on Osteoarthritis, Priya Chockalingam, Ph.D., from Wyeth Pharmaceuticals outlined an unpublished study showing that in preclinical animal models aggrecanase activity is significantly increased immediately following injury, suggesting the potential for postsurgery aggrecanase inhibition "to stop/slow down not only immediate cartilage degradation but also development of cartilage destruction in later years."

However, one of the challenges is to determine the link between acute phase intervention and long-term outcomes.

It has not been shown that surgical reconstruction of the torn ACL or meniscus will prevent later development of osteoarthritis (Am. J. Sports Med. 2007;35:1756-69). However, in the future it will be interesting to test if a combined surgical and pharmacologic approach, with added patient counseling on postinjury activity, might be more effective in preventing osteoarthritis (Cochrane Database Syst. Rev. 2005 [doi:10.1002/14651858.CD001356.pub3]; Br. J. Sports Med. 2009;43;347-351).

Until more is known about the long-term processes that take place after the acute phase of an injury, clinicians are faced with the challenge of advising patients about physical activity. We must consider whether we should not encourage our patients to return to the sport that injured them, but rather try to convince them that although they should remain active, it's not in their best long-term interest to return to that particular sport. ■

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