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## ACL & OA

Bruce Reider

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# ACL & OA

I am interested in medical research because I believe in it. I am interested in arthritis because I have it.

—Bernard Baruch, *New York Post*, May 1, 1959

I shuddered involuntarily as I read through the newly submitted manuscript. I knew that orthopaedic surgeons around the globe would find some of its statements unwelcome, even inflammatory. Each year, many eager young athletes ask us to reconstruct their anterior cruciate ligaments (ACLs) so that they can return to competition. My colleagues and I derive tremendous satisfaction from helping these youngsters realize their dreams. The paper in front of me suggested that we were merely enablers, lubricating the passage of a sizable chunk of the world's youth down the slippery slope to painful joint destruction. "We still lack evidence to suggest that ACL reconstruction decreases the rate of posttraumatic osteoarthritis in the knee," read the introduction. "In fact, it may even be hypothesized that an effective ACL reconstruction increases the risk of future osteoarthritis by enabling the athlete to return to high-performance pivoting sports—either through re-injury or because of the high demands put on the knee."

The study in question, by Myklebust et al,<sup>10</sup> chronicled the fate of 79 Norwegian team handball players 7 years after they had torn their ACLs. After consulting with their physicians, 22 athletes were treated nonoperatively and 57 had surgery: 47 bone-patellar tendon-bone (BTB) reconstructions, 8 primary ligament repairs, and 2 operations of an unknown nature. The athletes who did not have surgery were actually more likely to return to handball, a finding that implies that they were more motivated, more apt to be functionally stable "copers," or more tolerant of instability episodes than those who underwent surgery. The surgical techniques that were employed were often unsuccessful at restoring normal knee laxity: Among 42 BTB recipients tested with the KT-1000 arthrometer, 25 (60%) demonstrated 3 mm or more of side-to-side difference.

Although the nonoperatively treated patients in that study were twice as likely to experience instability, both groups of patients had comparable Lysholm scores, similar functional test performance, and a prevalence of radiographic gonarthrosis in the low-to-mid-40% range. Moreover, all the athletes with IKDC (International Knee Documentation Committee) ratings of *severely abnormal* had had surgery, mostly BTB reconstructions. Perhaps prompted by this finding and the fact that 22% of players who returned to play postoperatively reinjured their ACLs, compared with none of the 7 players who quit the sport

after reconstruction, the authors concluded that "it seems reasonable to question whether return to high-level pivoting sports really is in the player's interest—if long-term knee health is the primary concern."

Although that article has been cited at least 38 times since its publication, it created less of a stir than I anticipated. After all, it was only 1 study of athletes in 1 sport, at least some of whom had surgery with techniques currently deemed obsolete. In this month's *AJSM*, a group that includes 1 of the same authors takes a comprehensive look at the available literature on the prevalence of osteoarthritis (OA) 10 to 27 years after ACL injury. "Knee Osteoarthritis After Anterior Cruciate Ligament Injury," by Øiestad et al,<sup>12</sup> is a systematic review of 31 studies comprising patients treated with and without surgery. The modified Coleman methodology scores<sup>2</sup> of the 7 prospective studies examined ranged from 61 to 88 (on a scale of 90), whereas the scores of the 24 retrospective studies ranged from 22 to 59.

The occurrence of OA was examined in a number of ways. Based on all 31 studies, the prevalence of OA varied from 1% to 100%, compared with 0% to 38% in the contralateral knees. In the better-quality studies, however, the prevalence of OA in patients with an isolated ACL rupture was only 0% to 13%, whereas in patients with combined ACL and meniscal tears, the prevalence was 21% to 48%. Overall, studies that compared surgery with nonsurgical treatment found a similar prevalence of OA in both groups. Two studies<sup>5,11</sup> reported a higher prevalence of OA in patients treated surgically, although treatment was not randomized in either study. In general, the studies with higher methodology ratings reported a lower overall prevalence of OA. On the basis of their analysis, Øiestad et al decided that prior estimates placing the prevalence of OA after ACL rupture in the 50% to 100% range were too high.

The authors further analyzed the reports to delineate risk factors for the development of OA after ACL injury. Different studies identified meniscal injury, surgical treatment, age, obesity, abnormal joint laxity, loss of extension, time from injury to surgery, and poor performance on a functional hop test as markers of increased risk of OA. Øiestad et al concluded that among all risk factors identified by various studies, meniscal injury and meniscectomy were the best documented.<sup>9,11,17</sup> Given that returning to pivoting sports after ACL injury was not examined as a risk factor in the highest-rated studies, it was not possible to address the question raised by Myklebust et al concerning the advisability of doing so.

Øiestad et al point out that the cited studies defined OA according to a bewildering array of radiographic criteria but failed to note whether symptoms of OA were present, as recommended by the American Rheumatism Association.<sup>1</sup> This criticism may appear to be quibbling until one considers that radiographic signs of OA after ACL injury

do not often correlate with functional outcome scores.<sup>8,13,16</sup> For example, a study by von Porat et al<sup>16</sup> of male soccer players 14 years after ACL rupture found that 41% had radiographic signs of OA but that their Lysholm scores did not differ from those of the patients without OA. These authors noted that the Lysholm scores of their cohort actually increased between the 7- and 14-year follow-up evaluations, whereas the percentage of patients still participating in soccer declined from 32.0% to 7.8%. We do not know whether this change in lifestyle was a natural progression in generative behavior or an accommodative response to increasing knee symptoms, but it certainly illustrates the importance of correlating functional outcome scores with activity level.

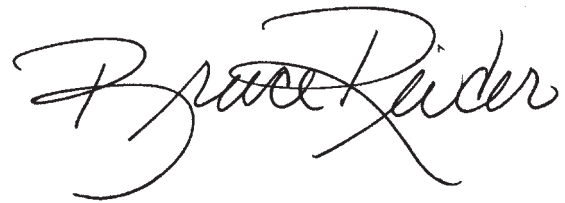
A potential explanation for the limited correlation between radiographic OA and functional outcome scores is that athletic patients simply ignore symptoms of OA and pursue their desired activities. This is suggested by a study of female soccer players by Lohmander et al that found that subjects with radiographic OA had significantly more pain and "other symptoms" but similar KOOS subscores for activities of daily living, sports and recreation, and quality of life compared with their arthrosis-free counterparts.<sup>8</sup>

Of course, what we consider to be long-term studies may simply be too short-term to reveal the potential detrimental effects of OA on ACL-injured athletes: Gillquist and Messner<sup>4</sup> stated that it may take 30 years for symptoms of OA to become severe enough to require treatment. Authors often make the distinction between mild radiographic changes and those that reach a level worthy of being called OA,<sup>6,8,16</sup> but these changes can progress over time. In a study of 101 patients after BTB ACL reconstruction, Lebel et al<sup>6</sup> found a significant increase in the number of patients with IKDC grade C and D radiographic changes between the 5- and 11-year follow-up examinations. Similarly, Salmon et al<sup>15</sup> found progressively worsening IKDC scores on the radiographs of 67 patients, taken 5, 7, and 13 years after BTB ACL reconstruction.

It seems logical that surgical reconstruction should reduce the risk of OA after ACL rupture, but proof of that proposition remains elusive 7 years after the paper of Myklebust et al first crossed my desk. Three possible explanations for this come to mind: The first is that the proposition is true but that the available studies are too flawed to demonstrate it. The problem with most, if not all, studies that compare reconstruction with rehabilitation alone is that the choice of treatment was made on an individual basis by each patient, thereby introducing potential selection bias to confound the results.<sup>3,5,10,11,16</sup> Present and future ACL registries may circumvent this problem, especially if they include ACL tears from the point of injury, regardless of subsequent treatment. The second possibility is that the techniques of ACL reconstruction for which long-term follow-up is available do not reduce the risk of OA but that more anatomic techniques currently being explored will do so. Unfortunately, it will take 1 or more decades to answer this question. The least attractive possibility is that OA is the inevitable result of a slowly falling cascade of dominoes set in motion by the initial trauma

and that ACL reconstruction can stabilize the injured knee but not prevent the late appearance of articular degeneration.<sup>7</sup> If this is correct, an improved understanding of the effects of trauma on articular cartilage may eventually indicate the means to block this progression.

There may be some truth in each of these 3 explanations, which provide several inviting avenues of inquiry for ACL researchers to explore. Meanwhile, our patients are eager to return to the sports they love. Resuming sporting activity after an ACL rupture may increase the risk of subsequent OA; indeed, at least 1 study has found that mere participation in elite-level soccer without apparent injury seems to increase the risk of later OA.<sup>14</sup> However, sports participation also yields both mental and physical health benefits of its own. In the words of Neuman and colleagues,<sup>11</sup> "some individuals not able to participate in sports because of a knee injury may be more affected in their QOL [quality of life] than affected by degenerative changes at radiography." While we continue to look for ways to decrease the risk of OA after ACL injury, we should strive to provide our patients with the highest-quality surgery and rehabilitation available.



Bruce Reider, MD  
Chicago, Illinois

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