

EDITORIAL COMMENTARY

MOVING ON FROM STUDYING ONLY THE ACL: THE IMPORTANCE OF SEX DIFFERENCES IN OTHER ORTHOPAEDIC INJURIES

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Our understanding of the anterior cruciate ligament (ACL) has advanced to the point where we understand female-specific predisposing factors to injuries; we have begun to alter surgical reconstructive procedures for women; and we can leverage enhanced sex-specific understandings to improve rehabilitation and even to prevent injuries. While study of sex-specific differences in posterior cruciate ligament (PCL) injuries has just begun, it is our responsibility within the field of sports medicine to continue to advance our understanding of sex differences in PCL and other orthopaedic injuries and to promote future studies examining this topic.

In the field of sports medicine, the understanding of women's injuries to the anterior cruciate ligament (ACL) has advanced dramatically over the past 20 years. Whereas it was uncommon for women to even participate in sports in the 1970's, increased sports participation has led to increasing rates of ACL injury and greater attempts to understand the anatomic and training factors behind this effect. We now know that ACL injuries are 4 to 8 times more common in women,¹⁻³ and compared to males, women are more likely to have non-contact injuries.^{4,5} While these are most common in adolescent women and in basketball, gymnastics, lacrosse and soccer, ACL injuries in women can be found across age ranges and in all sports.^{4,6}

But more than the incidence of injury, we also now further understand causative factors for increased ACL injury. Women have neuromuscular differences in movement patterns which lead to differences in dynamic knee valgus stress, quadriceps dominance, and trunk stability.⁴ Hormonal patterns may change the pliability of the ligament itself.^{3,7} We know that women differ in their social interactions with their team and the

injury recovery process.^{8,9} There are cultural and psychological factors that differ in men and women that relate to injury care and recovery.^{8,9}

Twenty-year outcome data for ACL reconstruction show sex-specific differences in IKDC scores, activity related pain, and graft reinjury.¹⁰ This has led to sex-specific treatments in approaching ACL reconstruction. Smaller graft sizes, for example, may be a consideration to avoid impingement in the knee in smaller women. Recently, the STABILITY trial demonstrated that the risk of failure of ACL reconstruction in those patients at higher risk for failure with a hamstring ACL improves with the addition of a lateral extraarticular tenodesis.¹¹ We have already begun to change our approaches to surgery and the type and extent of rehabilitation.

While we have advanced our understanding of sex-specific differences in treatment of ACL injuries, our understanding of sex-specific differences in other orthopaedic injuries is still very much immature.^{12,13} It is hard to think of any other orthopaedic injury where we understand as much about sex-specific differences in incidence, treatment, and care, as the ACL. Yet how can that

be? There are certainly more orthopaedic sports injuries worthy of this investigation. We as a specialty have just begun to focus more on traditionally women's sports, and we have just begun to study the meaningful clinically significant sex differences in injuries other than the ACL. There is still a relative disparity of knowledge about women's sports injuries.¹³⁻¹⁴

In their article "Sex Differences in Posterior Cruciate Ligament Injuries," Drs. Oganessian, Anderson, Simeone, Chang and Tanaka continue that pursuit of narrowing the information gap by evaluating patterns of injury in the posterior cruciate ligament (PCL) injuries on MRI.¹⁵ PCL injury patterns were found to notably vary between men and women. Women with PCL injuries were four to six times more likely to involve injuries of the ACL or MCL.¹⁵ While concomitant lateral collateral ligament injuries were common in both sexes, women were more likely to sustain medial and posteromedial associated injuries than men.¹⁵ Women were also older than men on average at the time of their PCL injury.¹⁵ These are clinically important observations that may impact our considerations of ligamentous injuries in women.

In and of itself, this type of study has limitations. As a retrospective imaging review, no clinical diagnosis information is included. Diagnosis of ligamentous injuries often takes a good clinical exam, frequently stress radiographs and even occasionally an examination under anesthesia. Demographics and clinical outcomes are not examined. Nonetheless, given the relatively uncommon nature of this injury, this study represents an important continuing step at our understanding of sex-specific differences in posterior cruciate injuries. Taken in context within a new body of literature examining sex-specific differences in sports injuries, this paper contributes a meaningful next step in closing the sex-specific knowledge gap.

Our understanding of the ACL has advanced to the point where we understand predisposing factors to injuries specific to women; we have begun to alter surgical reconstructive procedures for women; and we can leverage enhanced sex-specific knowledge to improve rehabilitation and prevent injuries. Neuromuscular training programs can reliably lead to at least a 50% reduction in ACL injuries in athletes.¹⁶ While study of sex-specific differences in PCL injuries has just

begun, it is our responsibility within the field of sports medicine to continue to advance our understanding of sex differences in PCL and other orthopaedic injuries and to promote future studies examining this topic.

Conflict of Interest Statement

The authors report no conflict of interest with the contents of this manuscript.

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