

High School Volleyball and ACL Injuries

Written by John Tomberlin

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The anterior cruciate ligament (ACL) is a vulnerable anatomical link in the knees of all female athletes.

Girls high school soccer and basketball present the highest risk for female athletes when it comes to knee injuries, comprising the highest rates of ACL injuries. But fall sports in Iowa are in full swing, so let's take a look at the high school sport with the third highest risk for ACL injury for girls: volleyball.

In high school sports, 50 percent of all knee injuries involve the ACL and girls are eight times more likely to suffer an ACL injury than boys. High school ACL injuries are eight times more likely to occur in competition than in practice. Research (2009 study) shows that nearly 100 percent of all ACL injuries suffered by high school volleyball players require surgery. This can be devastating to the player and the team.

The most common type of ACL injury in volleyball is via a non-contact mechanism, usually when landing on one leg while hitting or blocking at the net. Chasing down a ball to pass or dig the volleyball is a less common mechanism that may also contribute to an ACL injury. All of these mechanisms have one common element: a sudden application of load via a change of direction or sudden stop. When the load is too great, the ACL may stretch or tear.

Why are girls eight more times likely to tear an ACL than boys? Some studies have shown that hormonal influences and anatomical alignment factors may contribute to girls being at higher risk. More importantly, researchers have identified four key neuromuscular control factors that increase the risk for girls (versus boys) to tear their ACL:

1. Girls tend to land from a jump with straighter legs (less bend in the knees and hips)
2. Girls tend to have more inward bending of the knees (valgus) when landing from a jump
3. Girls tend to use a larger step to stop or change directions

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4. Girls tend to activate their quadriceps muscles (front of thigh) prior to hamstring muscles (back of thigh) when changing directions or landing from a jump.

The good news is, these four neuromuscular control factors are modifiable by sports medicine professionals (athletic trainers, physical therapists, strength and conditioning specialists) through education and functional prevention training programs. Here are practical solutions to decreasing the risk of ACL tear for girls in high school sports by addressing the four key factors listed above:

1. Teaching girls to land more “softly,” landing while emulating a shock absorber, by increasing the bend in the knees and hips. The use of mirror jump/land training can help tremendously and video analysis is a powerful tool for athletic injury prevention and performance enhancement.

2. Teaching girls to land from a jump while preventing the knees from bowing inward is imperative to prevention. Mirror therapy and video analysis is fundamental to this approach and improving hip stability (weak hip/buttock muscles allow the knee bowing in to occur).

3. Teaching girls to avoid a one large step to stop or change directions by an alternative method using multiple smaller steps.

4. Teaching girls to co-activate their quadriceps and hamstrings. This can be accomplished by functional stabilization training and biofeedback training as needed.

Repetition training is paramount for ACL prevention, where quality practice is more important than quantity of practice. This also means breaking athletic habits that high school girls may have learned over their volleyball careers, which takes persistence and attention to detail. For high school volleyball, the emphasis of two leg landings for all blocking and hitting can go a long way towards prevention on the court.

Prevention can have its rewards. I had the pleasure of instituting an ACL prevention program for

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the Kirkwood Eagles women's volleyball program in 2003. The Eagles had incurred a number of ACL injuries in prior years and were looking for a means of prevention that also included sports performance enhancement to improve their volleyball athleticism. The pre-season program lasted six weeks, and the girls found the program to be very challenging. The Eagles went undefeated in conference play that year and went on to win the NJCAA Division II national championship. More importantly, they did not suffer a single ACL injury that year.

For more information on ACL prevention for female athletes, check out these websites:

1. <http://girlscanjump.com/> (by Laura Ramos, PT, ATC former head trainer for the WNBA Detroit Shock)
2. <http://www.sportsmetrics.net/> (by the Cincinnati Sports Medicine Research and Education Foundation)

(John Tomberlin has worked with high school athletes in the Cedar Rapids Metro area since 1995. He was a four-sport athlete in high school and a high school coach for two years in Illinois. John has more than 25 years of experience working with athletes as a physical therapist and a certified strength and conditioning specialist. He has worked with professional athletes in the NFL, MLB, and on the PGA and LPGA tours. John also has worked with elite amateur athletes in alpine skiing, figure skating, and track and field.)