

**ON-SITE  
ORTHOPEDIC  
CLINICS EACH  
WEEK**

- No Charge
- Open to patients of all ages
- Appointments (918) 346-7800

**Collinsville Public Schools**Monday/Wednesday  
2:00pm—3:00pm**Coweta Public Schools**Wednesday  
2:45pm—3:30pm**Edison Preparatory School**Monday/Thursday  
2:45pm—3:30pm**Glenpool Public Schools**Tuesday  
2:45pm—3:30pm**Kellyville Public Schools**Wednesday  
Noon—12:45pm**Regent Preparatory School**Wednesday  
Noon—12:45pm**Rejoice Christian School**Monday/Wednesday  
3:15pm—4:00pm**Victory Christian School**Tuesday  
2:45pm—3:30pm**Wagoner Public Schools**Wednesday  
2:45pm—3:30pm\*Hosted by CSO  
Athletic Trainers and  
Physician Assistants.

## EXAMINATION OF THE SPINE AND EXTREMITIES: THE KNEE (PART 1)

Volume 7, Issue 9, April 2016

Orthopedic and musculoskeletal trauma to the knee is perhaps one of the most common injuries for recreational and competitive individuals. And, as injuries to the knee joint often require immobilization, rehabilitation, and oftentimes surgical repair, we will utilize the next several newsletters to not only discuss the knee joint in detail but likewise give you a “leg up” so to speak on how to reduce your own personal risk of sustaining a knee injury.

- Bones:** Femur, Tibia, Fibula
- Ligaments:** Anterior Cruciate Ligament (ACL)  
Posterior Cruciate Ligament (PCL)  
2 Collateral Ligaments (MCL, LCL)
- Muscles:** Anterior: Quadriceps Complex (4), Sartorius  
Lateral: Tensor Fascia Latae (IT Band)  
Posterior: Hamstring Complex (3), Popliteus,  
Gastrocnemius  
Medial: Adductor Complex (5)



### Lower Leg Physiology

The primary design of the structure is a simple hinge joint where both the tibia and the femur work together to accomplish the resultant flexion and extension motions of the joint. In addition, this joint also provides for a slight amount (<30 degrees) of rotation as the joint proceeds towards full extension. In fact, the joint literally rotates into a more stable position as the knee achieves full extension in order to brace itself for weight bearing. This action is known as the screw home mechanism and it describes exactly what takes place in the knee as the joint completes the last 10-15 degrees of extension. Literally speaking, the tibia rotates externally as the joint is being extended in order to align and “lock” the tibia in to the femur upon terminal extension. In doing so, the knee is not only set mechanically in to a structurally aligned position, but it likewise pulls slight tension on the ACL and PCL to provide for the extensive stability required of the joint just prior to the foot making contact with the ground. As weight is then progressively offloaded off the foot and lower leg and the knee begins to flex, the tibia will subsequently “unlock” from the femur by rotating slightly in the opposite (i.e. medial) direction.



### Central States Orthopedics Physicians

R. Clio Robertson, MD	Randall L. Hendricks, MD	Jeffrey R. Morris, DO	Brent C. Nossaman, DO	Debbie A. Gladd, DO
David R. Hicks, MD	David K. Wong, MD	Ronald S. LaButti, DO	Kathleen M. Sisler, MD	Casey L. Smith, MD
James D. Cash, MD	Bryan J. Hawkins, MD	Jeff A. Fox, MD	Troy A. Glaser, DO	Wendy B. Emerson, MD
David E. Nonweiler, MD	Thomas G. Craven, MD	Blake E. Shockley, MD	Bradley J. Lawson, MD	Chad E. Crawley, DO

## Common Injuries

### Anterior Cruciate Ligament Tears

As one of the more familiar injuries to the knee, the tearing of the anterior cruciate ligament is usually seen most frequently in sports and activities that require either planting and twisting or repetitive jumping and landing. Unfamiliar to most, however, is why the tearing of the anterior cruciate ligament becomes a season-ending injury for almost any athlete.

#### *What is the function of the ACL?*

Simply put, the ACL has two distinct functions in that it 1) keeps the tibia from excessively shifting anteriorly off the surface of the femur and 2) prevents excessive internal rotation of the tibia, respective to the femur. In short, the ACL provides for stability against the two most common stresses present on the knee joint during activity. Therefore, when the ligament is completely disrupted, the knee joint is grossly unstable and therefore unable to support the demands of activity.

#### *Why doesn't the ACL heal...or...Why is surgical repair of the ligament required?*

In order for any tissue to recover from a complete disruption, there must be continuity and approximation between the two fragments. Additionally, the two fragments must be held, without load being applied, in this position of continuity and approximation for a substantial amount of time. As the ACL resides in the center of the knee joint, it is basically impossible to achieve, let alone maintain, this positioning for a longer period of time.

#### *Why are ACL tears so common?*

Generally speaking, there are numerous sports and recreational activities that require jumping and landing as well as planting and cutting, all mechanisms that can injure the ACL. And, over the last 5-10 years these activities have spilled into younger and younger athletes where balance, coordination, strength, and endurance are not yet developed. This is just one of many reasons why ACL injuries are more common.

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## Injury Prevention

Efforts to prevent or reduce the likelihood of injuries to the knee joint should revolve around two basis tenants:

### **Strength and Appropriate Positioning:**

As the knee resides between two very dynamic joints (hip and ankle), extensive strengthening and appropriate positioning of the knee is paramount. And, the two must both be present in order to reduce the risk of injury. As appropriate knee positioning cannot be maintained without the strength to do so and as no amount of strength can truly support a joint that is grossly out of its ideal position, the two go hand in hand. Simply put, the muscles about the knee, predominantly the hamstrings and the external rotators on the outside of the hip, are usually more the 50% deficient from where their ideal strength levels should be. And, because these two groups of muscles help to keep the knee from traveling outside of its ideal position, they are crucial to preventing injury.

### **Coordination and Balance:**

Simply put, coordination means the ability to control and direct where your body is at in space. This is often referred to as a learned movement pattern. Much like playing the piano or typing on a keyboard can become second nature, coordination and balance training for the lower extremity is exactly the same. Exercises like single leg hops, balancing on unstable surfaces, heel raises, and foot ladders all increase one's ability to not only coordinate a movement, but likewise do so with ease. Provided that coordination and balance training are likewise coupled with strengthening and training in appropriate positioning, you have the basis for a very effective injury prevention program. For more information, consider reviewing our August 2009 Newsletter focusing specifically on the ACL. As always, all of our previous newsletters can be downloaded for free on our website:

[www.csosortho.com](http://www.csosortho.com)

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For our entire newsletter disclaimer, visit the Sports Medicine Newsletter page on our website: <http://www.csosortho.com/sports-medicine-monthly.html>

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