



Assessing and Diagnosing Knee Injuries in Pediatric Patients



**NATIONWIDE
CHILDREN'S**

Sports Medicine at Nationwide Children's Hospital

Nationwide Children's Hospital Sports Medicine includes a staff of physicians and surgeons, as well as athletic trainers, dietitians, physical therapists and support staff who are all trained to provide care to pediatric and adolescent recreational, competitive and elite athletes. In addition to treatment, Nationwide Children's offers an extensive program focused on research, education, injury prevention, strength and conditioning, and wellness.

Our comprehensive team of specialists works closely with coaches, athletic trainers, primary care physicians and parents to deliver age-appropriate care designed to get athletes back in the game as quickly and safely as possible.

Sports Medicine cares for over 15,000 patients per year at five central Ohio locations, and the Department of Orthopedics provides care for more than 35,000 patients per year at its locations in Dublin, downtown Columbus and Westerville.

Sports Medicine Clinic Expertise and Services

Our clinical staff works with the patient and family to diagnose and treat injuries and make recommendations for future sports activities. In addition, we coordinate care with the patient's primary care physician, athletic trainer, school nurse and coach. We strive to provide seamless care for our patients and families by facilitating appointments to Radiology, Orthopedic Surgery, Physical Therapy, Cardiology, Pulmonary, Neuropsychology, Nutrition and Health Education.

Services available at Nationwide Children's Sports Medicine include:

- Diagnosis and treatment of sports-related injuries
- Injury rehabilitation
- Sports Concussion Clinic
- Sports Nutrition Clinic
- Injury prevention programs and strength and conditioning services
- Educational resources and training to physicians, athletic trainers, school nurses, patients and families, and coaches

How to Refer to Sports Medicine

- Call (614) 722-6200 or toll-free (877) 722-6220
- Fax (614) 722-4000
- Online at NationwideChildrens.org/Sports-Medicine

Sports Medicine Locations

- Canal Winchester *Close To Home*SM Center
- Dublin Sports Medicine and Orthopedic Center
- East Columbus *Close To Home*SM Center at 6435 E. Broad St.
- Orthopedic Center at Nationwide Children's Main Campus
- Westerville Sports Medicine and Orthopedic Center



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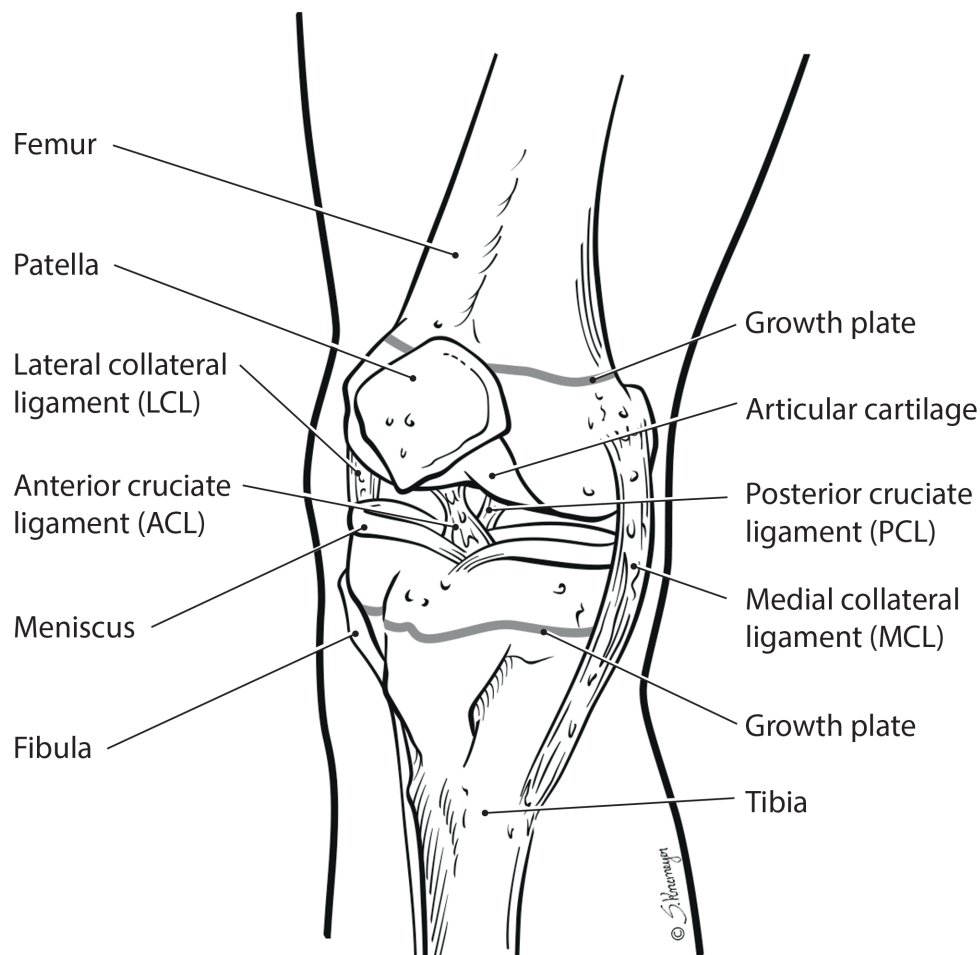
Knee Injuries in Children and Adolescents

More than 25 million children participate in scholastic sports, and another 20 million are active in community-based sports activities. Each year, an estimated 2.5 million sports-related injuries occur in adolescents. Knee injuries account for up to 60 percent of all sports-related surgeries on high school athletes. Sports and recreational activities are the primary causes of knee injuries in individuals under the age of 25.

The Skeletally Immature Patient

Knee injury patterns in the pediatric patient differ from adult injuries because of their skeletal immaturity. This affects patient management due to the types of injuries they are likely to have, as well as the diagnosis and treatment techniques.

In children and adolescents, open growth plates predispose them to unique injuries. Surgical treatment of growth plate fractures, for instance, requires special techniques. Physicians specially trained in the management of pediatric knee injuries have the knowledge of bone and ligament development, to provide accurate assessment and appropriate treatment.



Prevention

Many knee injuries can be avoided with proper training techniques, by maintaining muscle strength and flexibility, and by using proper equipment during physical activity. In addition, to reduce the risk of recurrent problems, the athlete should comply with the proper rest period and complete rehabilitation before returning to activity.

Assessing Knee Injuries in the Pediatric Patient

Children and adolescents require unique assessment and treatment for knee injuries. When pediatric patients present with swollen and painful knees following injury during sports or recreation, use this practice tool to help you assess the patient before consulting a specialist.

1. Patient Presentation

- Swollen knee
- Bruising
- Inability to straighten
- Tenderness
- Pain
- Locking or catching of the knee
- Giving way
- Stiffness

2. Mechanism of Injury

Understanding the situation in which the injury occurred can offer critical insight into the probable type and severity of injury. Establishing the timeline of injury and its signs and symptoms can also help physicians determine whether the injury is acute or chronic, as well as whether fracture is a possibility.

Upon presentation, physicians should consider asking patients the following questions:

- When did the injury occur?
- Has the patient suffered a previous knee injury?
- What caused the injury (direct blow, twisting or pivoting, cutting or quickly changing direction, powerful muscle contraction, jumping or landing, etc.)?
- When did swelling or pain begin?
- Could the patient continue playing or walking after the injury?
- Does the knee catch, lock or give way when standing or moving?
- Can the leg be fully straightened and flexed and/or does pain worsen with movement?
- Is motion or activity currently compromised?
- Are pain and swelling continuous or do they come and go?
- Is the knee bruised or tender to the touch?
- Can the patient bear weight?
- Are any congenital abnormalities present?

3. Common Pediatric Knee Injuries

Anterior cruciate ligament (ACL) tears, osteochondritis dissecans lesions (OCD), meniscus tears, and patellar dislocations or subluxations are common knee injuries in the pediatric population. All of these injuries may cause pain and swelling severe enough for patients to seek medical assistance.

Alternate Injury Possibilities

Other potential knee injuries that occur in pediatric populations and cause similar signs and symptoms, such as pain and swelling, include lateral collateral ligament (LCL) tears, posterior cruciate ligament (PCL) tears, medial collateral ligament (MCL) tears, discoid meniscus, physeal injuries and fractures. For more information on these conditions, please visit NationwideChildrens.org/Sports-Medicine.

4. Special Tests

A physical exam is often difficult because the pain and swelling hinder knee range of motion. Pediatric patients are more susceptible to growth plate fractures than adults. A complete pediatric knee X-ray series includes AP, Lateral, Notch and Sunrise views. When signs and symptoms of a knee injury are present, physicians must rule out signs of fracture:

- Can the patient do a straight leg raise?
 - Is the patient tender over femoral condyles or femoral growth plates?
 - Does the X-ray indicate a fracture?
 - Yes > Make immediate referral to Orthopedics
 - No > Refer to Sports Medicine for evaluation within three days
- If no X-rays are taken, refer to Sports Medicine within three days.***

Differential Diagnosis of Common Knee Injuries

Anterior Cruciate Ligament (ACL) Tear

The ACL connects the tibia and femur. The ligament is essential to knee stability in pivoting, cutting, jumping and landing. The majority of ACL tears are non-contact. About 70 percent of all torn ACLs co-occur with meniscal tears. The injury is more common among females. Patients may hear or feel a pop or tear at the time of injury, followed by swelling three to eight hours after the injury. Usually, patients with ACL tears cannot continue participation in physical activity.

Meniscus Tear

Each knee has two menisci that help stabilize the joint. The medial meniscus is torn more often than the lateral meniscus, and meniscus tears occur in as many as one-third of all sports injuries. Swelling often occurs within one to two days of the injury. Meniscus tears often cause locking or catching of the joint, inability to straighten the knee, pain when standing or squatting, and buckling of the knee.

Osteochondritis Dissecans (OCD)

This is a localized injury affecting the joint surface in which a segment of cartilage separates from the underlying bone. The injury is more common among males. Its cause is unknown, although injury, overuse, abnormal bone formation or loss of blood supply to the bone may lead to the injury. Pain is the most common symptom and sometimes worsens with activity. Swelling, a crackling sound, giving way, and locking or catching of the joint may accompany a tendency to walk with the foot of the affected leg externally rotated. In rare cases, some patients may feel a piece of bone floating in the joint.

Patellar Dislocation or Subluxation

Patellar dislocation or subluxation involves the displacement of the patella from its usual position in the trochlea. Usually this occurs laterally. Subluxations are more common in adolescents and young adults than dislocation. In a dislocation, patients may notice a lump on the inner or outer knee from the dislodged patella. In subluxations and dislocations, patients experience swelling, severe pain, bruising and the knee giving way. In rare cases, numbness or paralysis below the injury may result from an obstructed nerve.

Treatment

If patients present with pain and swelling in the knee, apply basic first aid: rest, ice, compression and elevation (RICE). Some injuries require immobilization to heal. Crutches can be used in patients who are unable to bear weight until the knee is pain-free and strong enough to support the patient without limping or giving way. In some cases, surgery is necessary for full repair of the ligament or removal of loose fragments of bone or cartilage. If surgery is required to correct an ACL, OCD or meniscus injury, surgeons trained in growth plate-sparing repair should perform the operation. These repair techniques are used exclusively in the pediatric population. Patients may require formal and/or self-managed therapy to regain strength, balance and flexibility.

Complications

Without proper treatment, pediatric knee injuries can lead to chronic knee problems, early arthritis, injury to surrounding tissues, and prolonged healing. If missed, injuries can also cause recurrent cartilage damage and instability in the knee, as well as unnecessary time away from physical activity.



For urgent consultation, call the Physician Direct Connect Line at (614) 355-0221 or (877) 355-0221. To make a referral or for more information, call (614) 722-6200 or (877) 722-6220, fax (614) 722-4000, or visit **[NationwideChildrens.org/Sports-Medicine](https://www.nationwidechildrens.org/Sports-Medicine)**.



Nationwide Children's Hospital Sports Medicine provides care at eight locations throughout central Ohio. For maps, directions and office hours of our locations, visit NationwideChildrens.org/Sports-Medicine-Locations.

To schedule an appointment at any location, call (614) 355-6000.

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7901 Diley Road, Suite 150
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Dublin

Sports Medicine and Orthopedic Center
5680 Venture Drive
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Hilliard

*Close To Home*SM Center
4363 All Seasons Drive
Hilliard, OH 43026

New Albany

Philip Heit Center for Healthy New Albany
150 West Main St.
New Albany, OH 43054

Downtown

Orthopedic Center
479 Parsons Ave.
Columbus, OH 43215

East Columbus

*Close To Home*SM Center
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Columbus, OH 43213

Marysville

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Westerville

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