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Overuse Injuries in Children

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GOALS:

1. Review the pertinent history and appropriate physical exam for children presenting with chronic joint pain from overuse injuries
2. Understand the diagnosis, management, and prevention strategies of the more common causes of chronic joint pain from overuse injuries

Overuse injuries are concerns that the general pediatrician may encounter frequently so it is important to recognize signs and symptoms of an overuse injury and understand the management. Especially problematic is year-round single sport; there is an increasing trend towards early specialization that makes particular overuse injuries more common.

Overuse injuries are a result of repetitive micro-trauma that exceeds the body's rate of repair. Muscles, tendons, bone, bursae, cartilage and nerves can all be affected. Children and adolescents are especially susceptible to overuse injuries during periods of rapid growth and open growth plates. Overuse injuries are common in all sports, but more often seen with any sport that emphasizes a repetitive motion.

The American Orthopedic Society for Sports Medicine has great resources online regarding injury prevention for sports that have the highest rates of overuse and trauma injuries.

In general, prevention of overuse and chronic injuries in youth sports include:

- Getting a pre-season health evaluation to identify any concerns that may lead to an overuse injury
- Proper warm up and cool down should be routine to prepare the body and recover afterwards
- Encourage the athlete to play different positions or sports thoroughout the year to minimize the risk of an overuse injury
- Discuss with the athlete the importance of avoiding playing through any pain they are experiencing as it can make an injury worse and lead to a shortened season
- It is also important to incorporate days off each week during the season and taking at least a couple of months off per year. Athletes should also delay sports specialization until later in puberty.

THE ELBOW

Chronic overuse injuries of the elbow are often associated with those sports that involve a repetitive throwing action or require a repetitive wrist flexion or extension like baseball. This type of injury also occurs with activity associated with weight bearing on the hands, such as gymnastics. The term "Little League Elbow" is used to describe this type of overuse injury. Kids will present with pain and tenderness over the medial portion of their elbow. This type of overuse injury is often associated with poor technique or excess number of pitches.

Treatment includes rest from throwing for at least 4 to 6 weeks, pain free strengthening, and stretching of flexor-pronator group of muscles. It should be followed by 1 to 2 weeks of progressive functional throwing regimen and rehabilitation. The amount of stress from throwing a baseball is especially concerning in growing children. The stress from this repetitive motion is absorbed at the cartilage of the ends of bone or the growth plate. This can lead to long term consequences to both the shoulder and elbow.

The growth plate is simply the growing tissue near the ends of the long bones in children and adolescents. Growth plates close when the skeleton reaches maturity and the bones stop growing.The issue is that the area of the growth plate is not as strong as the bone, ligaments, or tendons. When there is excessive strain and stress from any young athlete involved in repetitive training such as continuous throwing of baseball pitches, the cartilage of the growth plate has difficulty tolerating the excess stress. The cartilage of the joint also has the risk of being permanently damaged if there is continual stress. Therefore, identifying elbow, arm, or shoulder pain in young baseball players as early as possible is vital.

There are things that can be done to reduce the risk of injury. This includes limiting the number of pitches and days of pitching. Age specific guidelines on appropriate number of pitches has been established by the major baseball league and can be found on their website. It is also important to educate patients and parents that they should stop the activity immediately if they do experience elbow pain. If the pain persists, immediate medical evaluation should be made.

THE KNEE

Knee pain in general is a common complaint among the adolescent age group. Most often knee pain is associated with some type of trauma but can also be insidious. The knee is the largest joint in the body, which allows a hinge type of motion with some element of rotation. The knee consists of an intermediate joint between the patella and the femur and lateral and medial joint surfaces between the femoral and tibial condyles. Without proper treatment of pediatric knee injuries—chronic knee problems, arthritis, further injury to surrounding tissues, and prolonged healing can occur.

Recurrent damage to the cartilage will cause pain and increase risk of chronic instability of the knee due to the damage to the ligaments in addition to time away from physical activity.

A common form of chronic joint pain in adolescents is patellofemoral stress syndrome or PFSS. PFSS tends to have a female predominance and patients may often describe diffuse anterior knee pain. Patients may also complain of bilateral pain that worsens when going up stairs. This type of repetitive bending up and down causes the pain due to weakness or imbalance of muscles of the quadriceps and glutes.

When performing a physical exam, it is important to observe the patient's lower limb alignment and musculature. Be attentive of the medial muscles. Hamstrings become very tight with weakness over the front of the muscles. This give-and-take of the muscles causes a lot of stress over the front portion of the knee and causes irritation of the cartilage under the knee cap. There may be point medial patellar tenderness or pain with compression of the patellofemoral joint. There should not be the presence of joint effusion and usually you will have no other positive findings. Clinical diagnosis can be accomplished without imaging.

When discussing treatment, you should emphasize restoring flexibility, strength and improving any gait abnormalities. Treatment includes scheduled anti-inflammatory medications to help get the patient over the initial pain;

Physical Therapy is helpful. You can recommend formal physical therapy or informal at home. Essentially what needs to be done is the strengthening of the medial muscle of the quadriceps. Have them lay flat on the floor and do straight leg lifts with their legs slightly turned outwards to help strengthen that muscle. Simple hamstring stretches are also helpful. It's also important to strengthen the hip abductors (glutes).

Patients with weak hip muscles tend to have valgus (inward) collapse at the knee, which predisposes to patellar related pain, as well as other injuries.

You should recommend rest from the activity that is aggravating the pain for at least 1 to 2 weeks. In children with patellofemoral syndrome it is important to remind parents that this may require continual work. Even if the knee feels better and the child feels that they are able to go back to regular activity, it still doesn't mean that this pain will not come back again.

The patient should keep up with exercises and stretches to prevent worsening symptoms. It is important to know that some people are anatomically at risk for patellofemoral pain. If symptoms are chronic and fail conservative treatment, referral to an orthopedic surgeon is appropriate.

Another form of anterior knee pain that we encounter in the clinic is Osgood Schlatter Disease. Osgood Schlatter Disease is a type of apophysitis and is a common cause of knee pain in growing adolescents.

Apophysitis is commonly seen in active, growing children and adolescents. It refers to inflammation around the insertion point of a tendon adjacent to areas of growth. There are several types of apophysitis most commonly observed during periods of rapid growth.

Osgood Schlatter Disease is one of the most common causes of apophysitis, most often seen in adolescent males. These kids will present with anterior knee pain over the tibial tuberosity. Again, think about your runners and your jumpers-basketball players, gymnasts, and soccer players. They will describe point knee joint tenderness with running and jumping activities.

On physical exam, you will often see a bony prominence where they have had repeated injury or overuse, which has caused overgrowth in that area; basically, you will see a big knob below their anterior knee.
One thing to remember is that Osgood Schlatter isn't always painful and can coexist with other conditions. Be careful not to miss another diagnosis by assuming Osgood Schlatter is the primary culprit.

In regard to imaging, you could get an Xray. For Osgood Schlatter, you will see a widening of the epiphysis or a prominent bony overgrowth; but remember that you really don't need the Xray for diagnosis if you have a compelling clinical history and exam.

Another common knee problem medial tibial stress syndrome, or shin splints. Shin splints are one of the most common overuse injuries of the lower leg. It is especially common in runners. The pain occurs with activity, often towards the end of a period of exercise. Shin splints may progress to a tibial stress fracture without rehabilitation and can be distinguished due to more focal/severe tenderness that occurs during an entire workout. Diagnosis can be made by history and physical exam. Usually on exam, there is diffuse tenderness over the lower third to half of the distal medial tibia. Any focal tenderness or tenderness of the proximal tibia is suspicious for a stress fracture.

Management and treatment for both shin splints and tibial stress fractures is similar. This includes rest at least 7 to 10 days before commencing exercises. Stress fractures need longer recovery period, up to 6 weeks. Again, this is very challenging to an avid runner. Scheduled anti-inflammatory medication is also recommended. Correcting technique that led to the shin splints is important as it can lead to gait disturbances. Orthotics, shoe inserts, heel cups are simple ways to help prevent overuse injury.

Plain X-rays of the tibia for shin splints and early stages of a tibial stress fracture are usually negative. However, over a longer period of time of overuse, there will be some cortical changes on x-ray to indicate a stress fracture. In some cases, an MRI or bone scan can help with diagnose. Often areas of overuse and point tenderness will light up on these imaging tests.

The Ankle and Foot

Severs Disease is another type of apophysitis. Remember as we discussed earlier, apophysitis refers to inflammation around the insertion point of muscle and its tendon around areas of growth in a child or adolescent and most commonly observed during periods of rapid growth. Severs Disease presents with calcaneal pain, also associated with running and jumping. Excess use causes irritation over the growth plate of the calcaneus. The pain can also be bilateral. These kids may also have a tight gastrocnemius muscle or achilles.

On exam for these kids, you will observe point tenderness over the insertion site of the calcaneus. The squeeze test is also helpful. Basically cup your hand around the heel and give it a good squeeze over the sides. If the kid jumps off the table in pain, that is helpful for diagnosis. In regards to treatment, you should recommend modifying activities. These kids will benefit from orthotics and heel pads to cushion the blow. In more severe or chronic cases, immobilization of the ankle is useful to stop the pull of the achilles on the open growth plate of the calcaneus. Calf stretches are also helpful. It's important to counsel these patients that recurrent pain is common as long as the growth plate remains open

On the subject of pain from overuse injury in the foot area, we should talk about plantar fasciitis, which is due to inflammation of the plantar aponeurosis or the fibrous tissue beneath the skin on the sole of the foot. Plantar fasciitis is more common in adolescents or young adults. Patients, often athletes, will report heel pain with activity that is worse with the first steps of the day or several hours after non-weight bearing activity. Any activity that places excess stress on the heel with chronic pulling and a tight achilles, such as running, ballet, or other types of dance can increase the risk of plantar fasciitis. Diagnosis of plantar fasciitis can be accomplished by medical history and physical examination. Tenderness may be elicited on the medial calcaneal tuberosity.

Severs disease is due to chronic pulling of the Achilles tendon on the calcaneal apophysis. While plantar fasciitis is associated with repetitive strain or injury that causes micro-tears to tissue around the heel of the bone or other connective tissue on the sole of the foot.

Treatment includes rest from weight bearing activity. Pain relievers such as ibuprofen and naproxen may ease the pain and inflammation caused by plantar fasciitis. Stretching and strengthening exercises or using special devices may relieve symptoms. Often the cause is due to wearing shoes with inadequate arch support. New shoes or semi-rigid arch supports can decrease the pain. Stretching the calves and plantar fascia is helpful. As long as the gait is not affected, usually these patients can continue with regular activity. However, you should warn patients and parents that complete recovery often takes at least 6 months. Usually no tests are necessary. An X-ray or MRI could be performed to make sure another problem, such as a stress fracture, is not causing the pain.

Red flags of joint pain complaints

Signs and symptoms that indicate immediate referral should include a history of significant trauma and evidence of severe local inflammation. Don't forget to ask about other symptoms, such as history of fever, weight loss, night pain, malaise, rashes, and refusal or inability to bear weight. These symptoms should never be ignored.

Growing Pains

Growing pains is a real thing, the formal name is actually benign nocturnal pains of childhood. Prevalence is believed to be 10 to 20 percent of children. The exact etiology is unknown. Some believe that these kids have more sensitive perception to pain. Age of presentation is usually 4 to 10 years old. It is important to note that these are not your adolescents during times of growth spurts. These kids will actually present with pain over pre tibial area and thighs- so think in-between the joints. Sometimes, they will complain of pain over the axial skeleton or upper extremities. There may be a history of evening or nighttime pain. Parents will describe kids crying and rolling around during bedtime and not wanting to go to bed due to the pain. However, just as we discussed, a red flag would be if the pain actually wakes the

child up from sleep. Usually these kids will wake up in the morning fine with no complaints of daytime pain or discomfort. The pain and discomfort can be worse after excess activity earlier in the day, and heat and massage is helpful. You could consider muscle creams—Tylenol and ibuprofen sparingly such as during a very active day of activity. Growing pains is also a clinical diagnosis with the absence of other concerning features. There may also be a history of other members of the family with similar complaints. You could consider ordering labs including a CBC, LDH, Uric Acid to help rule out concerns of malignancy. Xrays and bone scans are usually not helpful, except when ruling out other causes.

SUMMARY

In summary, participating in organized and recreational athletics is a great way to combat the growing obesity problem in our youths. However, this puts kids at risks of overuse injuries which can be less apparent than something like a fracture and can easily go on ignored until it worsens. The important thing to remember is to identify risk of these injuries, educate the patient and parents regarding minimizing risks of injury and provide recommendations for appropriate treatment to prevent further chronic issues. A good history and physical exam can provide the clinical diagnosis. Rest from activity and modification of technique can be beneficial and minimize further injury. Scheduled anti-inflammatory is also helpful. Physical therapy, either formal or informal will help these kids with strengthening and mobility.