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SPORTS MEDICINE MONTHLY

Editor: Darren H. Lunow, M.Ed, ATC, LAT, Athletic Trainer

Surgical & Non-Surgical Care. Sports Medicine. Physical Therapy.

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MEDIAL KNEE PAIN

Perhaps one of the most painful and subsequently debilitating injuries for female athletes today is medial knee pain. Whether soccer or volleyball, basketball or lacrosse, medial knee pain is seen in almost every sport that involves female athletes today. As you can imagine, the common theme is activity, but it is primarily caused by a few functional lower extremity characteristics that are more prevalent in the female athlete.

To further understand the cause and thereby the solution to such conditions, a brief review of anatomy and physiology is helpful.

The knee joint itself is made up of the lower end of the thigh bone (i.e. femur) and the upper end of the shin bone (i.e. tibia). This is the true knee joint where the flexion and extension of the knee occurs. On the front of this joint is the kneecap (i.e. patella). The patella is a sesmoid bone that lives in the quadriceps tendon just anteriorly to the knee joint. By inserting the patella into the quadriceps tendon, the leverage force provided by the quadriceps during weight bearing, jumping, and running is increased. However, this also presents the challenge of maintaining ideal patellofemoral positioning during such activity. As this positioning is highly affected by overall knee position, ligamentous stability, and muscular strength; any variance or injury in any of these stabilizing structures can create a greater tracking challenge for the patella on the femur. When such positioning is consistently challenged or hindered, this is when a majority of our patients begin experiencing medial knee pain.

The Quadriceps's Angle

The term Quadriceps's Angle corresponds to the angle with which the center shaft of the femur articulates with the center shaft of the tibia. In other words, the angle with which the femur and the tibia meet to create the knee joint. According to research and studies, the average Quadriceps Angle, or Q-Angle, for males is 10-15 degrees whereas an average Q-Angle for females is 15-20 degrees. This is primarily a function of the size, shape, and overall design of the female pelvis being structurally wider than that of a male. If the pelvis is wider in its position and yet the knee joint stays in its same position, the overall angle between the two steepens.

Patellar Positioning:

The patella, by its anatomical structure, is designed to track directly in the center of the femur. This position is further supported by retinacular and extra-articular ligaments that keep the patella from tracking left to right out of its notch. Ideal patellar positioning is quite easy on a knee joint with a Q-Angle between 10-20 degrees. However, in a patient with a Q-Angle larger than 20 degrees, it becomes quite challenging on the medial restraining ligaments to hold the patella in its ideal location. This challenge in tracking is where the medial knee pain usually begins. And, in athletes who place such demands on their knees with the activities associated with their sport, proper tracking becomes an even greater challenge.

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Treatment Options

For those who have been challenged by medial knee pain as a function of patellofemoral tracking, much can be done to improve the overall well-being and function of the knee.

Hip Abduction Muscle Strengthening:
The muscles which live on the outside of the hip joint and move the leg away from the body are known as the Hip Abductors. They include the Gluteus Medius, Gluteus Minimus, and the Tensor Fasciae Latae. Ideally, under resistance, these hip abductors should be capable of resisting 40lbs of force. However, most adolescent and younger age females usually only manage half of that.

Foot Supination or Flat Feet:
Both a supinated foot or an excessively flat arch have a tendency to make the foot and thereby the tibia move slightly medially towards the other leg during foot strike. As the such positioning moves the tibia medially, it can also increase the Q-Angle that is dependent on the positioning of the tibia. Granted this is only a few degrees, but sometimes something just as simple as proper footwear and foot positioning can make a very big difference.

Vastus Medialis Oblique (VMO) Muscle Strengthening:
The innermost quadriceps muscle is primarily responsible for two things: knee extension and medial patella positioning. As focused strengthening of this muscle occurs in activities such as stairs that only require the last 15-25 degrees of full knee extension, isolated strengthening of the VMO can be easily accomplished and for some, quite helpful.

Q-Angle cont...

If this tracking challenge of the patella on the femur continues long enough, the articular cartilage between the femur and the patella on the posterior side of the patella can become inflamed, painful, and will eventually begin to fray, tear, and roughen. In addition, the patella's restraining and articular ligaments can become sprained and thereby unable to provide the restraint they once were able to. As all these factors begin to compound, appropriate patella positioning and tracking on the femur now becomes a reoccurring difficulty. And where the body is concerned, this is usually the time where chronic symptoms such as pain, swelling, and occasional popping in the knee are beginning to be seen. By definition, this progression in medial knee pain has become a condition known as Patellofemoral Syndrome.

Although, repetitive damage has now been done to the joint and its structures, the treatment options previously discussed can still reduce overall symptoms and discomfort. For some however, challenges may continue in activities such as squatting, climbing stairs, running downhill, and jumping. This is where surgery may become an option. However, keep in mind that such a condition usually starts out small as general knee pain that wasn't managed effectively. Therefore, most patients with medial knee pain can see great improvements in their overall condition as a result of the care provided to them by their Athletic Trainer, Physical Therapist, or Orthopedic Physician.

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