



THE UNIVERSITY OF TOLEDO MEDICAL CENTER

ORTHOPAEDIC MONTHLY

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Student Interest in Health-care Field Rises after Working in Orthopaedic Center



Part of the Orthopaedic Center's mission is to train and educate future leaders in the medical field. For the past two summers, the Orthopaedic Center has been given the opportunity to participate in The University of Toledo's REACH program. REACH is an outreach and recruitment program intended for high school students in the Toledo area, particularly those of backgrounds that are historically underrepresented in the medical community.

REACH, an acronym for Research Experience and Awareness of Clinical Health, is an eight-week nationally recognized program that offers students a meaningful experience in a variety of health-related fields, geared toward stimulating an interest in a health sciences career.

According to Daniel Hanna, a senior from St. John's Jesuit High School, working in the Orthopaedic Center has been beneficial in seeing patients in a variety of settings. "Working in the Orthopaedic Center has been the best experience overall," Hanna said. "It is an extremely busy and fast-paced environment. I've been given the chance to see all different types of patients from arthritis to tumors. It's also been helpful for me to be able to follow a patient from their clinic visit, to X-ray imaging, to surgery. There really couldn't be a better hands-on experience."

During the REACH program, students are paired with basic science or clinical professionals who mentor the students as they

work on laboratory or observational research projects. According to Diamond Crumbly, the REACH program has allowed her to see career possibilities in the health-care field. "I've been able to look at different aspects of the medical field," Crumbly said. "We've learned about additional options in the medical field such as being a nurse practitioner or a physical therapist. We've also been able to observe outpatient surgery while on the hand service. I was really surprised how sensationalized surgery is on television."

Falyn Woodby, a senior at Start High School and Ms. Crumbly's colleague, shares a similar sentiment. "Working in Orthopaedics and participating in the REACH program has really opened my eyes to other careers in the health-care field besides becoming a doctor," Woodby said. "However, observing surgery and participating in a cadaver lab were two of the best experiences I've had while in the program."

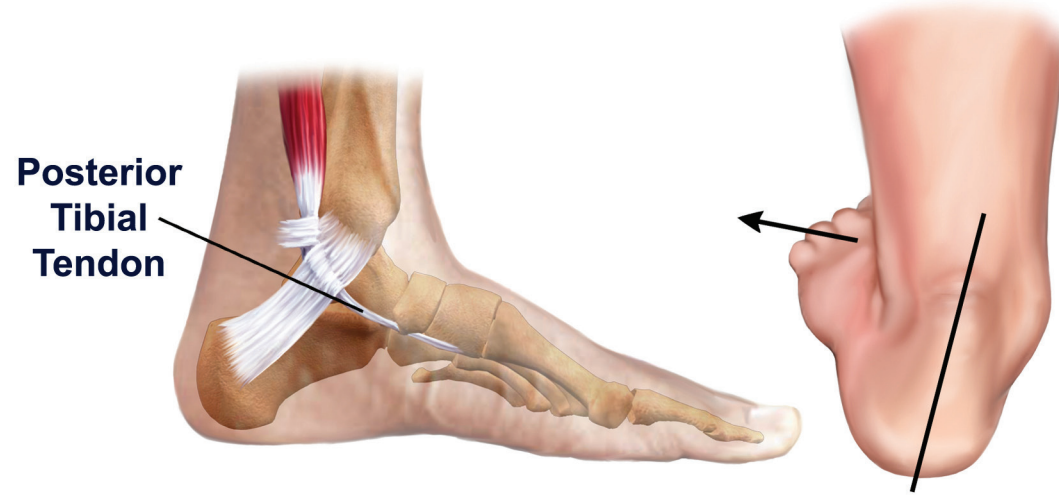
The REACH program, which runs from June to August, culminates in a research forum where each student presents his or her findings from the past two months. While working in the Orthopaedic Center, students have been given the opportunity to shadow physicians in the clinic, observe surgery, work in radiology and help in registration. According to Matthew Boyd, a senior at Whitmer High School, this is a very unique program.

"REACH has had a positive impact on me, as it has given me experience I could not gain anywhere else," Boyd said. "It has helped me narrow down my future career objectives."

An important part of the REACH program is to allow students to experience different parts of the health-care field. According to Dawn Scotland, a senior at Central Catholic High School, the experience has given her a solid foundation for setting up a career path. "REACH helped me gain hands-on experience and a better insight into the medical field," Scotland said. "After working here, nursing looks like a great option for me." ■

Dr. Nabil Ebraheim
Chairman and Professor of Orthopaedic Surgery

Posterior Tibial Tendon Dysfunction



A tendon is a band of fibrous tissue that connects muscle to bone allowing the joint to bend. Tendons enable participation in physical activities such as running, jumping and other movements. The posterior tibial tendon starts in the calf and descends down the leg behind the inside of the ankle and attaches to the foot's arch. Its function is to support the medial arch and sub-talar joint as the body passes over the foot. When the posterior tibial tendon becomes inflamed or is overstretched, the ability to support the arch is impaired resulting in flattening of the foot.

Posterior tibial tendon dysfunction, as this phenomenon is called, can be attributed to several factors:

- tendon overuse.
- exposing the foot to a significant load
- obesity
- hypertension
- trauma
- diabetes
- inflammatory diseases such as rheumatoid arthritis.

Patients with posterior tibial tendon dysfunction will often present with pain and swelling on the inside of the ankle, loss of the foot's arch (flatfoot), tenderness over the mid-foot and an inability to stand on the toes.

To diagnose posterior tibial tendon dysfunction, physicians will likely use the "too many toes" test. Here, the physician measures abduction of the forefoot. If the posterior tibial tendon is damaged, the forefoot will deviate outwards in relation to the rest of the foot and will appear to have too many toes when viewed from behind. In addition to the "too many toes" test, the physician may ask patients to do a single heel rise. Here, patients are asked to stand with their hands on the wall and lift the unaffected foot off the ground and raise the toes on the affected foot. If the heel does not rotate inward, there is posterior tibial tendon dysfunction.

Posterior tibial tendon dysfunction can be classified in four stages.

STAGE I – characterized by an inflamed posterior tibial tendon with normal strength. Upon examination, the patient will be tender to palpation but may show little or no change in the arch of the foot. While X-rays will most likely show no changes, an MRI will likely reveal mild to moderate tenosynovitis.

STAGE II – characterized by a partially torn tendon or degenerative changes. Here, the physician will note considerable flattening of the arch without arthritic changes and will have a positive too many toes sign. X-rays will reveal abduction of the forefoot while an MRI will reveal a partial tear.

STAGE III – characterized by severe tendon degeneration with a rupture likely. Patients with stage III posterior tibial tendon dysfunction will present with rigid flatfoot. X-rays will likely reveal abduction of the forefoot and collapse of the talo-navicular joint while an MRI will show a tear in the tendon.

STAGE IV – is similar to stage III with the addition of an arthritic ankle joint.

Treatment for posterior tibial tendon dysfunction can range from conservative to surgical depending on how far the condition has progressed. In its early stages, physicians will often utilize rest, anti-inflammatory medications, and immobilization. If the foot fails to respond to conservative treatment or the condition has progressed too far, there are several surgical procedures that can be utilized. First, physicians may perform a tenosynovectomy. Here, the surgeon will debride and excise inflamed tissue surrounding the tendon. A second option is an osteotomy. Here, the surgeon changes the alignment of the calcaneus and may remove a portion of the bone.

A third option is a tendon transfer where fibers from another tendon are used to repair the posterior tibial tendon. Finally, surgeons may fuse one or more bone together, eliminating movement in the joint through a process called arthrodesis. During this procedure, the forefoot is stabilized. ■

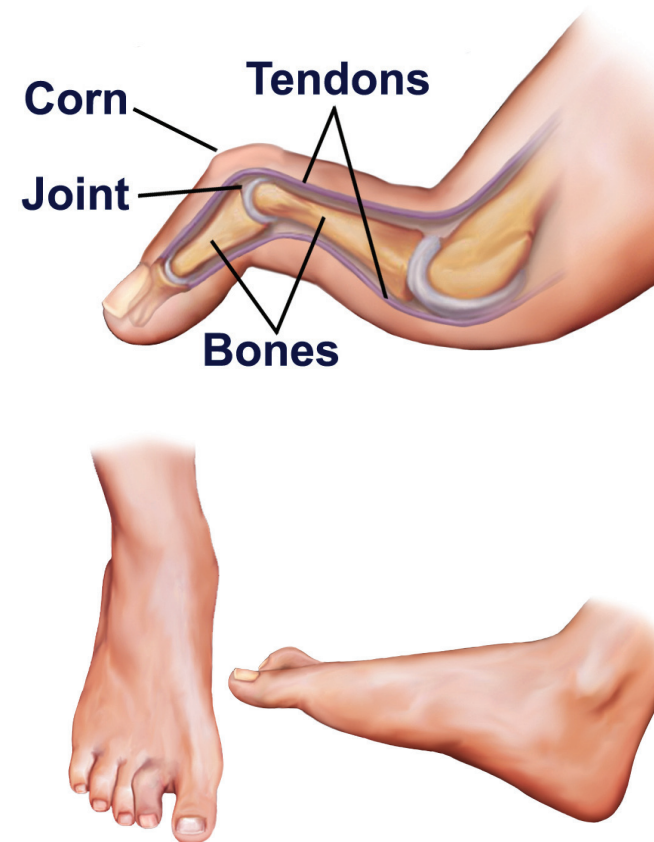
Hammertoes

Hammertoe refers to a deformity of the proximal interphalangeal joint of the second, third, or fourth toe causing it to be permanently bent. The interphalangeal joint lies between the proximal phalanx and the middle phalanx of each toe. In its early stages, hammertoes are flexible and can be managed conservatively. As the deformity progresses, the muscles tighten, the toes become more rigid, and there may be a need for surgical intervention.

There are several factors that cause hammertoes. The most common cause is a muscle/tendon imbalance which leads to bending of the toes. If there is an imbalance in the foot, the smaller muscles can be overpowered by the larger flexor and extensor muscles. When the flexor digitorum longus muscle contracts first and overpowers the smaller muscles, it pulls on the proximal phalanx. This causes the outer two joints of the toe to bend downward resulting in hammertoe. Second, hammertoes are often caused by poorly fitting shoes. Here, the issue is shoes that crowd the toes. These include shoes that narrow toward the toes and shoes with a higher heel forcing the toes against the front of the shoe. In other cases, hammertoe can be congenital (inherited) or caused by traumatic events such as a broken toe.

Patients with hammertoe will usually report pain or irritation to the toes when wearing shoes. In addition, corns and calluses on the affected foot are also common symptoms. Corns are a build-up of skin on the top, side or between the toes caused by constant friction.

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Bowleg

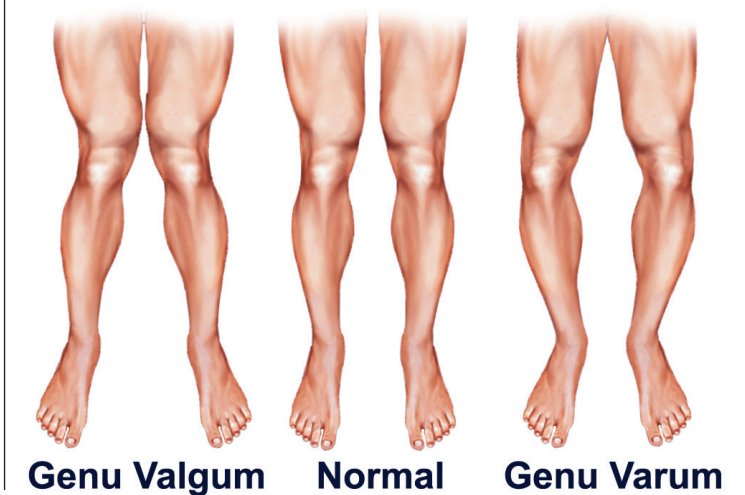
Bowleg, also known as genu varum, is a deformity characterized by medial angulation of the leg in relation to the thigh. This angulation causes outward curvature of the femur and tibia resembling a bow.

For children, having bowleg is part of normal development. Until the ages of three or four, children's legs will have a degree of genu varum. From ages three or four until ages five or six, children experience genu valgum which is characterized by the knee angling outwards. As this corrects itself, children are usually left with normal alignment. It is important for physicians to determine if the bowing is physiologic or pathologic in nature. Physiologic bowing is part of normal development while pathologic bowing is due to disease processes.

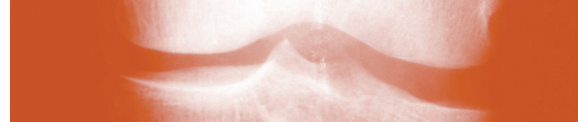
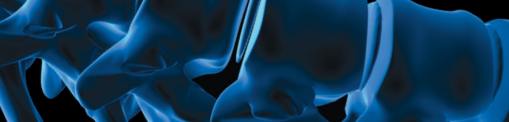
There are several pathologic causes of bowleg including rickets, Blount's disease or trauma. Rickets, which is characterized by a vitamin D deficiency and lack of calcium, prevents ossification (bone tissue formation) of bone potentially leading to fractures and deformity. Blount's disease is a growth disorder of the tibia in which the lower leg turns inward, bowing progressively. While the cause is unknown, it is thought to persist due to the effects of weight on the growth plate. In addition, bow leg can be attributed to fractures that heal with an outward curvature and arthritis that affects the inside of the knee more than the outside.

Physicians are usually able to diagnose bowleg through a combination of physical examination and X-ray imaging. During physical examination of the legs and knees, physicians will measure the distance between the knees when the child's ankles are held together. Ligamentous instability and knee motion will also be assessed. Physical examination findings can be confirmed with x-rays of the affected joints. While children generally have no symptoms, adults may present with discomfort on the inside of the knee from excess pressure on the joint.

Treatment is not usually necessary for children earlier than 3-1/2 years of age as bowleg is a normal anatomical variant in young children. However, if the condition worsens, physicians may utilize orthotic braces, special shoes, casts or surgery. When the deformity arises in older patients, surgery may be the only option. ■



Genu Valgum Normal Genu Varum



Hammertoes *continued from page 3*

Calluses, like corns, are a build-up of skin, but on the bottom of the toe or ball of the feet. To diagnose hammertoe, physicians perform a physical examination looking for redness, calluses or corns, and measuring flexibility and stability of the foot.

Treatment for hammertoe depends on how the deformity has progressed. In its early stages, hammertoe can be managed conservatively. This would involve possible changes in shoe wear such as avoiding pointed shoes, shoes that are too short, or shoes with high heels. In addition, physicians may suggest orthotic devices, splinting to realign the bent toe, anti-inflammatory medications, padding corns or calluses or trimming of the corns or calluses (done by the physician).

If the deformity is too severe or fails to respond to conservative treatment, surgical intervention may be needed. The most common form of surgical intervention involves removing a small section of the bone from the affected joint; this is called arthroplasty. Another common surgical method is arthrodesis. This involves fusing a small joint in the toe and straightening it with a fixation device used to hold the toe in proper alignment during healing. There are other surgical procedures that can be utilized including tendon/muscle rebalancing or lengthening and tendon transfers. ■

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Neither Dr. Ebraheim nor Dave Kubacki have any relationships with industry to disclose.

For medical questions you would like to see addressed in this newsletter, please e-mail Dave at david.kubacki@utoledo.edu.

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