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COMMON RUNNING INJURIES

In order to have a better understanding of the types of injuries that occur with running, it is important that you understand the mechanics involved in running. There are 3 phases of running; impact phase, propulsion phase and recovery phase.

Impact Phase: Controlled pronation (This occurs when the foot strikes the ground and the arch flattens out). throughout the musculoskeletal system, predominantly at the knee and foot via flexion (bending). Shock absorption is modulated by eccentric control (muscle lengthens while contacting against resistance) of knee flexion and adduction (towards the body) as well as foot pronation.

Propulsion Phase: As a prelude to propulsion, the hip must be loaded. The center mass should be over the foot, with the knee slightly flexed; but not over the toes. If flexion continues the knee is loaded more than the hip and propulsion takes on a greater vertical component than optimal. However, if optimal eccentric control of shock absorption occurs, the hip can be loaded efficiently. Hip loading requires the pelvis to be positioned over the foot with the torso slightly anterior (in front) of the hips and the knee posterior (behind) to the toes.

Recovery Phase: Begins at the completion of toe-off. The swing leg is advanced in an unloaded fashion and then positioned to absorb impact. Stride length is dependent on the opposite leg. If the stance leg is poorly loaded at the hip, hip extension will be minimal and forward thrust will be less, and stride length shortened.

Now that you have a basic understanding of the running mechanics, you can have a better understanding of some of the injuries associated.

Plantar Sling Dysfunction: Failure of the inside shin (medial tibia) muscles to control the rate of pronation due to lack of endurance or inadequate strength will result in over pronation and increased internal rotation (rotation towards the midline) stress on the leg and knee. This causes overload of the plantar fascia, eccentric overload to the Achilles tendon and medial tibial muscles; and increased valgus (“knock” knee appearance) at the knee.

Coronal (up/down and side/side movements) Plane Weakness: Failure of the gluteus medius (buttock muscle) to maintain the pelvis in a level position during single leg stance results in overstretching of the iliotibial band, increased valgus at the knee, overload of the adductors, increased load to the lower leg by excessive ankle dorsiflexion (pointing the foot towards the head) and internal rotation, and ultimately, increased load to the medial pelvis and femoral neck.

Transverse (rotational movements) Plane Weakness: Failure to control rotational stress by the external rotators of the hip results in increased internal rotation of the hip and the knee. This causes strain on the sartorius (a thigh muscle) and tensor fascia lata (lateral thigh). Conversely, if the adductors and internal rotators are overactive or if the external rotators are weak increased compressive load results on the femoral head and neck and there will be increase shear on the pubic rami (pelvis bones).

Poor Muscular Integration: The inability to co-activate muscles with the proper timing and intensity will also result in mechanical inefficiency and muscle overload. Failure to engage the gluteal muscles (buttocks) during stance phase will cause overload to the adductors, quadriceps, hamstrings, or sartorius. This will cause weak and inefficient push-off and a short stride. Underactive adductors will result in lateral (outside) thigh stress, abduction (away from the midline) of the leg and foot and valgus load at the knee. Failure to engage abdominal muscles will cause a destabilized trunk and flexion rather than lean during stance.

Sagittal (straight ahead movements) Plane Imbalance: Tight hip flexors (front of thigh/hip) will cause excessive flexion during stance and push-off phase resulting in increased compressive forces at the hip and knee. Hip extensors (back of hip/thigh) and abductors (outside of thigh/hip) are inhibited, shortening the stride; and hamstrings are overloaded as they attempt to stabilize the proximal (closest to the pelvis) leg and pelvis. Poor co-contraction of the quadriceps and hamstrings will result in increase knee flexion during stance elevating compressive forces at the knee and causing an increased vertical component to push-off.

Nilesh Shah, MD is the Medical Director for Summa Center for Sports Health and Pinnacle Sports Medicine. Dr. Shah is a board certified family practice physician and fellowship trained in Sports Medicine. Dr. Shah offers **same day / next day physician appointments**, including concussion evaluations. To schedule an appointment, call the St. Thomas office 330-379-5051 or Hudson office 330-342-4612.

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