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Postural Concerns in Track and Field

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Introduction.

Efficiency of movement is a primary element of success in athletics. Often, given the direction of our society toward the easy life, our young athletes have not developed the postural integrity needed for high performance. Posture is clearly related to the efficiency of movement and performance out come. The purpose of this article is to examine the function of postural musculature (especially the spinal and abdominal musculature) as applied to athletics and to recognize the implications of the same for performance and training.

The abdominal and spinal musculature (the "pillar" of the body) performs several functions, including protection of internal organs, movement, stabilization and elastic energy production. For the purposes of this article, we will be connected primarily with the functions of stabilization and elastic force generation.

Stabilization

When a force is applied to any body, proper stabilization of that body is necessary to insure that the force applied produces optimal displacement of the body and not distortion within the body. Force applied to an unstabilized body becomes absorbed as angular movements of individual body parts at the expense of displacement.

Example: The push up. Without stabilization of the pillar region during the movement, the trunk would sag to the ground as the body is lowered to the ground. The force of gravity would cause the sagging if the abdominal musculature did not contract to stabilize the pillar region.

Since optimizing the displacement of the body is a primary concern in athletics, stabilization of the body via action of the postural muscles is critical. The unique anatomical structure of the human body implies that certain ideal postural alignments must be maintained to optimize performance. The lack of stability in a body as a force is applied to it often results in the force being applied eccentrically. This produces rotation in the body rather than optimal displacement and creates stability problems in the locomotive process.

Such an eccentric force occurs at takeoff in the jumps when the strength of the athlete s not sufficient to counter the forces of takeoff. An eccentric line of force results, typical of the jumper "collapsing" at takeoff.

Elastic Force Generation

We know that the muscles are able to generate more force when a contraction is preceded by a stretch of that same muscle tissue. This elastic energy gain results from stretching of associated contractile and connective tissues as well as the reflexive action resulting from that stretch. The process of human locomotion is cyclic in nature. Various oscillating movements of the pelvis occur in both transverse and frontal planes during the cyclicaction of running. Postural alignments and stabilization patterns that help to facilitate these oscillations results in a tremendous elastic energy gain at no metabolic cost. We must simply employ techniques which evoke these reflexes.

There is an optimal rhythm that produces maximal elastic energy. The interesting side of this elastic energy generation is that we do not have to volitionally produce it. We must "allow" it to happen. As an example, we can look at maximal speed running. Coaches who understand that there is a maximal controlled rhythm for the system (an optimal "harmonic") recognize that pushing beyond this point will inhibit elastic energy generation and disrupt the harmonic. Thus cueing the athlete to "relax as you fatigue".

Specific Postural Issues

In human locomotion, postural integrity issues center around alignment of the head, spine and pelvis. Improper alignment of these creates potential for ineffective force application and potential for injury.

The head should be kept in its natural alignment with the spine. Misalignment of the head creates compensatory muscle action to counter misalignment. Such compensatory movements occur at great cost. Recruitment patterns are altered and vestibular function (balance) can be disrupted.

Example: The long jumper who looks down at takeoff creates potential for increased forward pelvic tilt, and the resulting negative effect on force application on the board.

A slight upward tilt of the pelvis is conducive to maximizing force application and elastic force generalization. A neutral position would result in a slight compromise in force application, while a forward tilt of the pelvic girdle would result in both impaired range of motion of the hip and greatly sacrificed elastic force generation.

We all have seen the sprinter who exhibits little knee lift yet shows a great deal of "backside" action in the sprint stride. Often showing a great deal of forward lean and high tension levels, this athlete appears ready to fall on every stride. More often than not, the culprit is a marked forward pelvic tilt (which results in the inhibition of the elastic cycle and thus increases metabolic expense).

The impairment of free movement of the legs associated with a downward rotated pelvis results in inefficient extension patters. Also, the body wrestles with forward rotation and stability problems that increase opportunities for co-contractors in related musculature. These co-contractions are then potentially manifested in the form of injuries to the hamstring, groin and quadriceps. Also note that since the spine, head and pelvis are tied together via musculature, ineffective alignment of one will have a bearing on the others.

Posture and Elastic Energy Conservation

Posture misalignments generally result in sacrificed during the locomotion process. When these situations occur, musculature that normally contributes to elastic energy gain is recruited instead to perform a dual function. When they are used to stabilize due to faulty alignment, elastic function is compromised. This decrease in elastic energy generation results in increased metabolic cost (promoting fatigue) diminished force application and increased injury potential.

Implications for Training

The training of the pillar region of the body is a must to achieve optimal performance. The stabilization role of this area is fundamental to providing prime movers a stable point from which to pull.

Often, the posture of an athlete is a function of his/her lifestyle. The athlete needs to make a conscious effort to change lifestyle patterns that promote poor posture and alignment. Overstuffed non-supportive chairs, high heals and other societal baggage can be overcome with patience and awareness. The goal of a postural development program is to begin with a plan to establish proper stabilization patterns and through repetition, progress to non-volitional application of the same.

The Fundamental Rule in Doing Postural Work

Regardless of the movement or exercise used, the athlete must first stabilize the hip girdle before moving. Contraction of the abdominal group locks the pelvic girdle in place (recall that the pelvic girdle is normally a very movable joint). When stabilized, the hip provides a solid area from which the leg extensors and flexors can pull. If the athlete does not first stabilize the pelvic girdle before firing the hip

flexors, the hip flexors will pull the pelvis forward, limiting range of motion and causing incorrect recruitment patterns.

It is better to do less volume in pillar work and do it right than to do high volume that is a result of improper technique. Many athletes can do hundreds of "crunches" but do them improperly – firing the hip flexors before stabilizing. This simply reinforces poor pelvic tilt tendencies.

Final Thoughts

The pelvic region is the root of movement in track and field. Since the prime movers of the legs connect to the pelvic girdle, range of motion and elastic energy generation around this joint are the foundation of optimal performance. Often, athletes train the legs and upper body at very high levels, but then tie them together with a weak pillar region. Stabilization of the pillar region during movement requires that the pillar region be trained at an equally high level. Understanding the nature of postural integrity gives the coach the information needed to develop exercises to train stabilization potential of the pelvic girdle and efficient posture.