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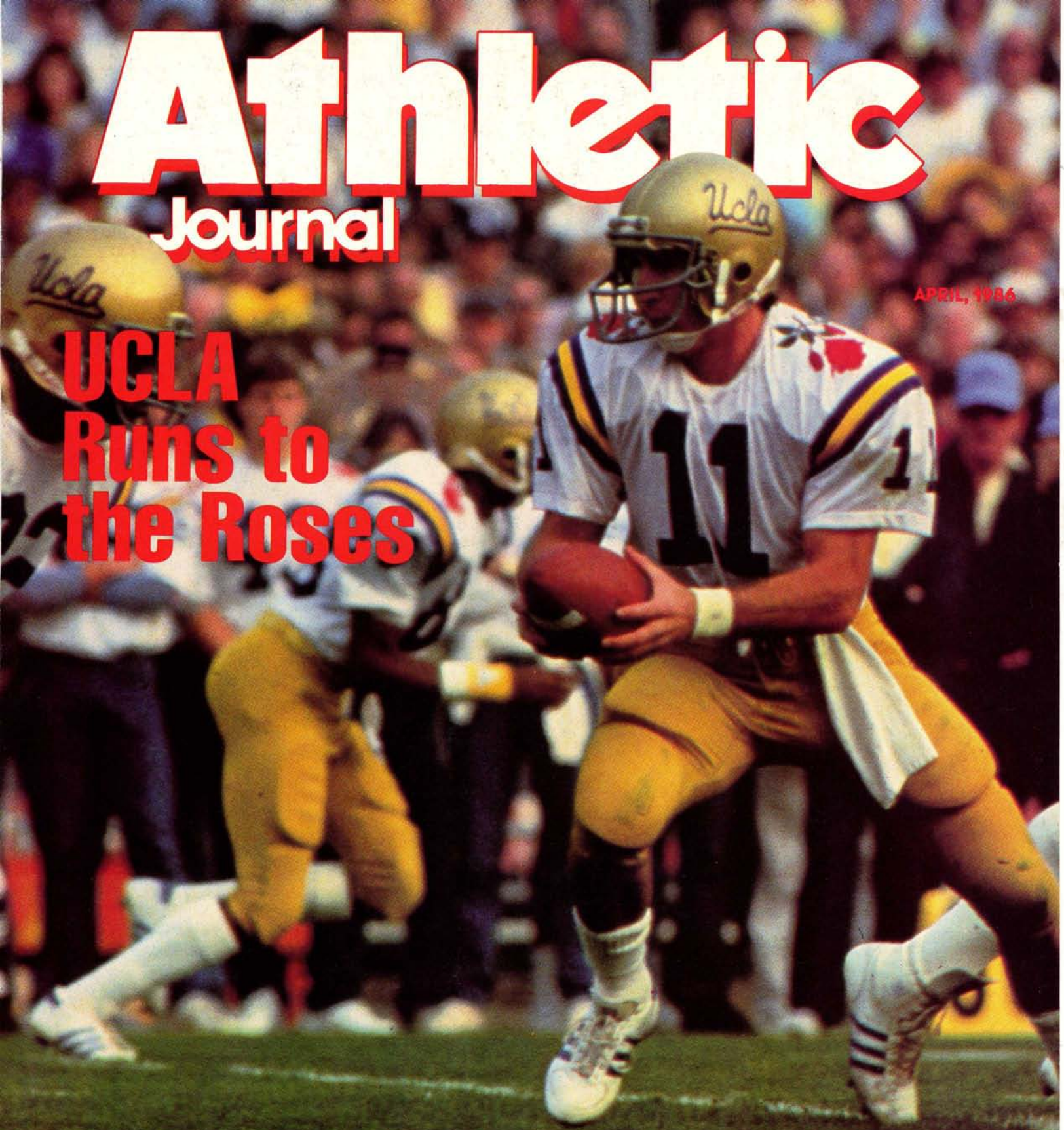

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# PLYOMETRICS: A Giant Step Backwards

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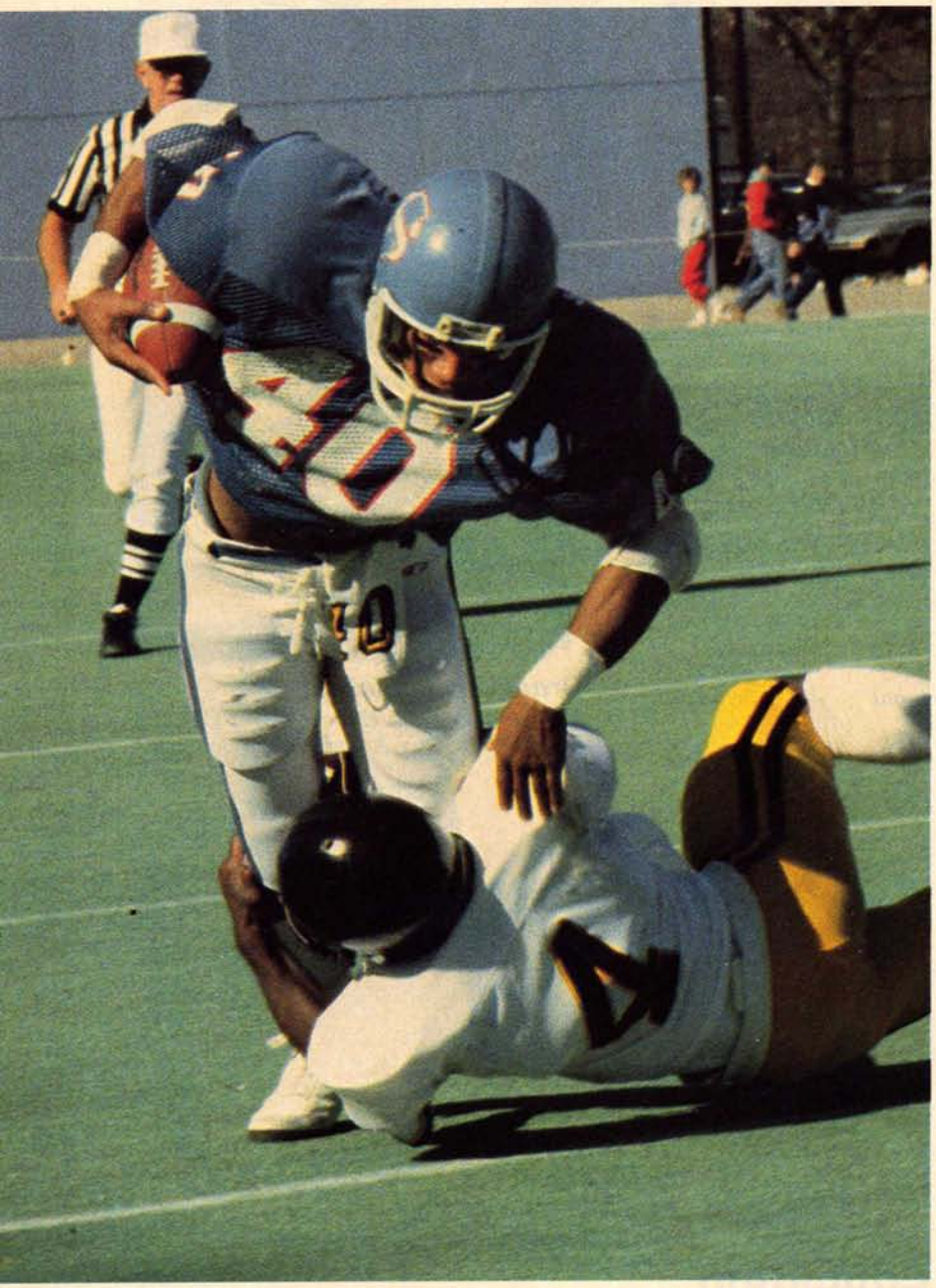

*The demands placed on the body from plyometric training are even more severe when dealing with heavier-than-average athletes such as football players. Photo/Indiana State University.*

Plyometrics is an area of conditioning that is beginning to receive a great deal of attention in the strength training profession. Purportedly, plyometric training represents the "link" between strength and speed. It is yet another "secret" training technique brought back from the Eastern Bloc countries. (One can only wonder what would happen in this country if Soviet coaches began feeding their athletes cow chips!).

Originally, plyometrics was (and still is) quite popular among track and field coaches in the mid to late 1970's. However, it is now being used to increase jumping ability and running speed in a wide range of sports - volleyball, basketball and football, to name but a few.

The term "plyometrics" applies to those drills or exercises in which a muscle is forcefully pre-stretched prior to a contraction. Theoretically, the elastic nature of muscle fibers allows a muscle to store potential energy during the eccentric phase of a movement which is then released as kinetic energy ~~during the eccentric phase of a movement which is then released as kinetic energy~~ in the ensuing concentric contraction causing a rapid, explosive movement. Various exercises (e.g. bounding, hopping, in-depth jumping and box drills) have been developed in which the force of gravity (coupled with the athlete's bodyweight and, in some cases, weighted vests and/or dumbbells) is used to elicit this so-called "stretch" (or myotatic) reflex of a muscle.

As in any activity that involves repetitive, ballistic movements, the potential for injury is extremely high. Injuries primarily occur when outside forces acting upon a joint momentarily exceed the structural integrity of the muscles, bones and connective tissue. When performing plyometric exercises, numerous parts of the musculoskeletal system are exposed to extreme biomechanical loading. The connective tissues of the foot, ankle, hip and the intervertebral discs all act as natural

shock absorbers in an attempt to dissipate the imposed stress.

As an example, in-depth jumping requires an athlete to step off a box and, upon making contact with the ground, move his body directly upward as rapidly as possible. Proponents of plyometric training recommend that the heights used for in-depth jumping be between .75 and 1.1 meters (roughly, 2½ to 3½ feet) in order to produce "maximum dynamic strength gains." Obviously, the body's framework absorbs a tremendous amount of force at impact from a jump of even the shortest of suggested heights. These forces are magnified as the height of the jump increases. Some researchers have used a height as great as 3.2 meters (over 10½ feet!). This is analogous to stepping out of a second floor window - and makes about as much sense. The demands placed on the body are even more severe when dealing with heavier-than-average athletes such as football players. One veteran NFL quarterback related to me how his joints ached the morning after performing approximately two hours of various plyometric drills. Indeed, a major Eastern university where, coincidentally, plyometric training is advocated as a conditioning modality, was forced to cancel spring football practice due to a multitude of injuries.

Recently, upper body plyometrics have been introduced. Not surprisingly, the potential for injury is also high when plyometric exercises are prescribed for the upper torso. The following is a list of possible injuries which may result from plyometric training:

**Foot:** heel bruises, plantar fascia strain, fallen arches, fractures of the metatarsals, fractures of the os calis (which may predispose the athlete to arthritis) and several other stress-related fractures.

**Ankle:** ankle sprains and fractures and Achilles tendon strains and ruptures.

**Lower Leg:** skin splints and leg fractures (the tibia and fibula).

**Knee:** collateral ligament sprains, meniscal damage, osteochondritis dissecans, dislocated patella, patellar tendinitis, fractured patella and chondromalacia.

**Low Back:** vertebral compression fracture, inflammation of the synovial lining, calcific formations and arthritic degeneration. A prominent doctor in the sports medicine field has suggested that plyometric training may lead to mechanical compression of nerves and possible sciatic conditions. Furthermore, he stated that cervical symptoms (e.g. inflammation and loss of motor ability) may occur as a result of the extreme forces being transmitted upward towards the skull.

**Shoulder and upper arm:** bicipital tenosynovitis, humeral and clavicular fractures, shoulder synovitis, bursitis and strains. Violent forces propagated through the long axis of the humerus (as in performing "drop pushups") may also cause acromioclavicular and glenohumeral sprains.

**Elbow, forearm, wrist and hand:** carpal navicular fractures, hyperextended elbow (which may result in a fracture or dislocation), forearm splints and fractures, strains and sprains of the elbow, forearm, wrist and hand.

Young athletes are even more prone to trauma since their musculoskeletal systems are relatively immature. The epiphyseal plates of their long bones haven't fused yet, thereby making the head and neck of the femur especially vulnerable to injury. Plyometric training may also aggravate Osgood-Schlatter's disease in adolescents.

Before adopting any training program, a coach should ask himself, "What am I trying to accomplish?" If the program is designed to promote gains in strength, your answers should be: (1) to decrease my athletes' injury potential and (2) to increase my athletes' performance potential.

**Plyometric training exposes athletes to unreasonably high risk of injury, as numerous parts of the musculoskeletal system are exposed to extreme biomechanical loading.**

Then, we must weigh the risks versus the benefits and decide if the ends justify the means. Even if plyometric training is a productive method of stimulating gains in strength (which, by the way, has not been proven conclusively in a properly conducted study), it exposes athletes to an unreasonably high risk of injury and therefore should be avoided.

As coaches, we have a legal responsibility to prevent injury to our athletes. If a coach fails to foresee the inherent danger of a particular activity, then he should be held personally liable for negligence.

On the basis of the aforementioned information, plyometric training represents a giant step backward in strength training and a coach would be ill-advised to introduce such a program to his athletes. □

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