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Safe Play Tips for Parents, Coaches and Young Athletes

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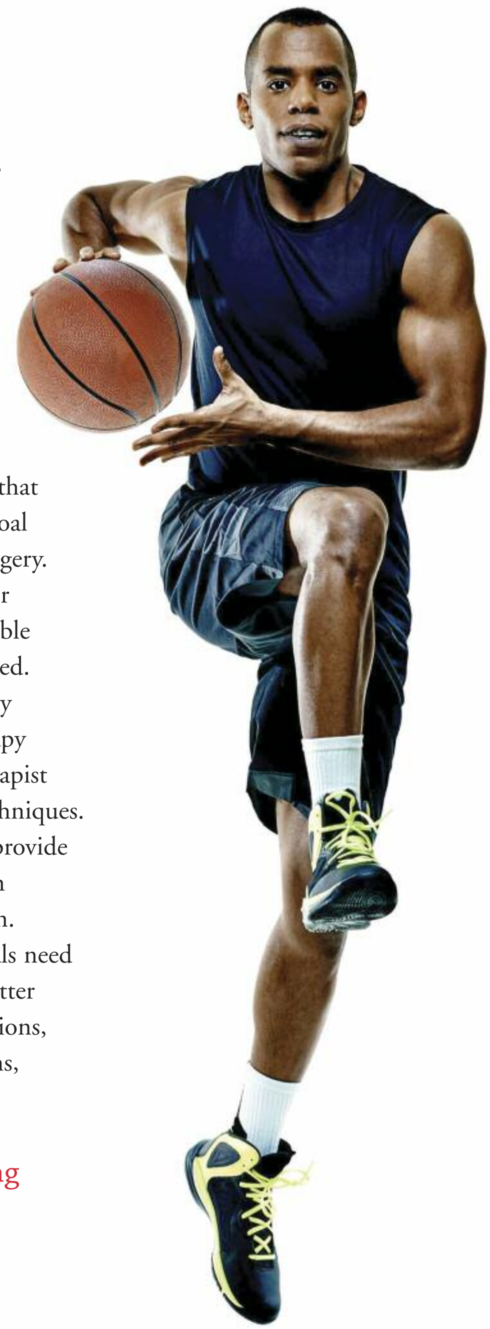
Blood Flow Restriction Therapy 101

By Ashley Anderson, MD, and Lance LeClere, MD



Muscle weakening after surgery is common, and rebuilding muscle strength postoperatively is often the key focus of rehabilitation programs. Recently, a novel rehab technique has gained interest from patients, surgeons, and therapists looking to more quickly regain muscle strength and size after surgery.

Blood flow restriction (BFR) is a modification to traditional exercise methods such as resistance training or walking. The technique utilizes the application of a blood pressure cuff. A selected pressure is used to block off a vein in the limb, and then the patient performs resistance exercises at approximately 20% to 30% of one repetition maximum. BFR creates an anaerobic environment and at lower oxygen tension levels the body recruits muscle fibers normally reserved for more strenuous exercise. In return the stress on the muscle fibers leads to increased growth of the muscles. BFR has quickly gained interest as an exercise technique and could be a revolutionary tool in the field of rehabilitation medicine to decrease time to return to sport postoperatively. Additionally, BFR training is being used as a supplement to routine resistance training and could result in increased strength and muscle in healthy athletes.

Although early reports are promising, BFR is being studied further in order to determine effectiveness and safety. Current literature suggests that BFR while exercising at lower intensity could be used with subjects after surgery or in populations unable to perform higher levels of exercise with routine resistance training. BFR seems to provide a rehabilitation boost that may have promising influences in the goal to achieve accelerated function after surgery.

However, it is important to remember that serious complications may be possible if BFR technique is not properly followed. Do not attempt BFR training or therapy on your own—only perform BFR therapy under the supervision of a physical therapist that is trained and qualified in BFR techniques.

Overall, the utilization of BFR may provide patients a safe method to begin strength training at earlier stages of rehabilitation. However, further large-scale clinical trials need to be completed in order to obtain a better understanding of physiology, complications, side effects, standardized treatment plans, and long-term patient outcomes.

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Concussions in Soccer—What to Know

By Christopher J. Tucker, MD

Sports-related concussions have become a significant public health concern in the United States, with more attention being directed towards youth sports and in particular, potential prevention measures. This attention is warranted, as youth athletes between ages 5 and 18 account for 65% of all sport- and recreation-related head injuries in U.S. emergency rooms.[1] Unfortunately, this incidence is rising, with concussions comprising approximately 13% of all sport-related injuries at the end of the 20th century, compared to only 5% 20 years earlier.[5]

The rates of concussions in high school soccer players is not to be underestimated. Among the nine most popular high school sports studied, the rate of concussions per athlete exposure (AE) for female soccer players is second only to male football players (0.73 vs. 0.94 per 1,000 AEs), and male soccer players are fourth in incidence with 0.41 per 1,000 AEs.[7]

Youth soccer has gained significant popularity in the last four decades, with the number of high school participants increasing from 49,593 male and 0 female players at 2,217 schools in the 1969–70 season to 417,419 male and 375,564 female players at 11,718 and 11,354 schools, respectively, in the 2013–14 season.[4] As a sport, soccer contributes multiple physical, social, developmental, and psychological benefits to many of our youth during their formative years, yet it also has been shown to pose the risk of injury. Most commonly, these injuries involve the lower extremity such as the ankle and knee, with the most common injury involving player-to-player contact during competition and noncontact mechanisms more common during practice.[11] However, soccer players are also at significant risk of sustaining sport-related concussions. The rates of soccer-related concussions during competition has been reported to be 9.2 per 10,000 AEs for girls, and 5.3 per 10,000 AEs for boys.[3]

The increased awareness of the incidence and severity of concussions in sports has led to increased attention on the subject. Several former U.S. Women's National Team members, including Brandi Chastain, Cindy Parlow Cone, and Joy Fawcett have joined the Sports Legacy Institute in forming the organization Parents and Pros for Safer Soccer, in an effort to address this issue. They have called for banning soccer ball heading in programs below the high school level as a means to reduce concussions.[9] While this effort is notable, it also assumes that heading is a major contributor to the incidence of concussions and the banning of this aspect of the sport will lead to a significant decrease in injury.

The research around this subject is still not fully developed. Some studies have reported that heading is responsible for between 31% and 37% of youth-related soccer concussions.[3,11] Concussions have also been implicated as a cause of neurocognitive, neuropsychological, and postural control impairments.[10] However, the connection and causation between the act of heading the ball, player-to-player contact, and the sustainment of a concussion is still being explored. A large review of the National High School Sports-Related Injury Surveillance Study's High School Reporting Information Online (High School RIO), an Internet-based sports injury surveillance system, has demonstrated that heading was the most common soccer-specific activity associated with concussions (in 31% of boys' and 25% of girls' concussions).[2] However, the same review also determined that the most common concussion mechanism of injury was direct player-to-player contact (69% in boys and 51% in girls), regardless of whether the act of heading was involved or not.[2] Additionally, several controlled laboratory studies have shown that the act of heading a soccer ball is not associated with neuropsychological or neurocognitive test performance or postural control measures.[6,8] Thus, it has been postulated that the act of heading itself is not an isolated causative factor for concussions, but rather the nature of contested heading during competition leads to more frequent player-to-player contact, which is the driving factor related to concussions in soccer.

To affect the most change, prevention efforts need to be evidence-based and culturally acceptable. Banning heading from youth soccer is a controversial topic and is just one aspect of the overall picture. Soccer is a physical sport, and evidence has shown that player-to-player contact is by far the most common mechanism of sustaining concussions. Efforts to reduce player-to-player contact across all aspects of the game, whether through stricter enforcement of current rules of the game, athlete education, and focused coaching techniques, will likely result in the most meaningful reduction in all injuries, including concussions.

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To Screen or Not to Screen for ACL Injury Risk: That is the Question for Our Youth Athletes

By Seth Sherman, MD

Youth sport participation is on the rise, particularly among female athletes. Approximately three quarters of American households have a child who plays organized sports.[1] ACL injuries are of particular concern because adolescents with major knee injuries are more prone to functional deficits, poorer quality of life, and increased risk of obesity in the decade following injury.[2] Screening programs may help to identify youth athletes at higher risk of ACL tear. Targeted injury prevention strategies may help reduce the incidence of ACL injury.

Any sport that requires running, jumping, cutting, pivoting, or landing—such as basketball, football, or soccer—creates a higher risk of ACL tear.[2] The vast majority of athletes require surgery to restore stability and function. Surgery mandates a 6- to 12-month minimum recovery period, carries a real risk of inability to return to pre-injury level of activity, a risk of recurrent ACL tear, and increases the chance of progressive arthritis over time.[3,4] Because of these consequences, it makes sense to try and avoid all of this trouble by focusing on reducing the rate of ACL injuries in the first place.

While some ACL tears caused by physical contact or collision may be unavoidable, roughly 70% of ACL injuries are non-contact and possibly preventable. Young females are at a 2 to 6 times increased risk of non-contact ACL injury compared to males.[3] While there are many contributing factors that increase the injury risk profile in young females, researchers have identified a few key faulty movement patterns that may put them at higher risk.[2,5,6] These faulty patterns (i.e., dynamic knee valgus, stiff landing, and others) may be detected prior to injury using landing and cutting maneuvers.

Accurate detection of movement patterns can be accomplished using "gold standard" 3D marker-based systems.[5] Limitations of widespread screening using this technique include the requirement of a laboratory setting, increased cost, and the need for highly trained technicians. 2D camcorder-based systems are mobile and less expensive, but there are issues regarding their efficiency and accuracy.[7] Research is now focusing on the development and validation of ACL injury risk screening tools using that use the Microsoft Kinect.[8] Collaborative researchers are working toward the goal of developing portable, low risk, inexpensive, accurate, and efficient means to screen for ACL injury risk.

There is no perfect screening test or tool for ACL injury risk detection. Understanding the magnitude of the problem is a critical first step. Clinicians and researchers must team up with players, parents, coaches, and athletic trainers to identify high-risk athletes. The goal of ACL injury reduction may not be far out of reach if we can use safe, efficient, and low cost injury screening methods along with targeted injury prevention programs.

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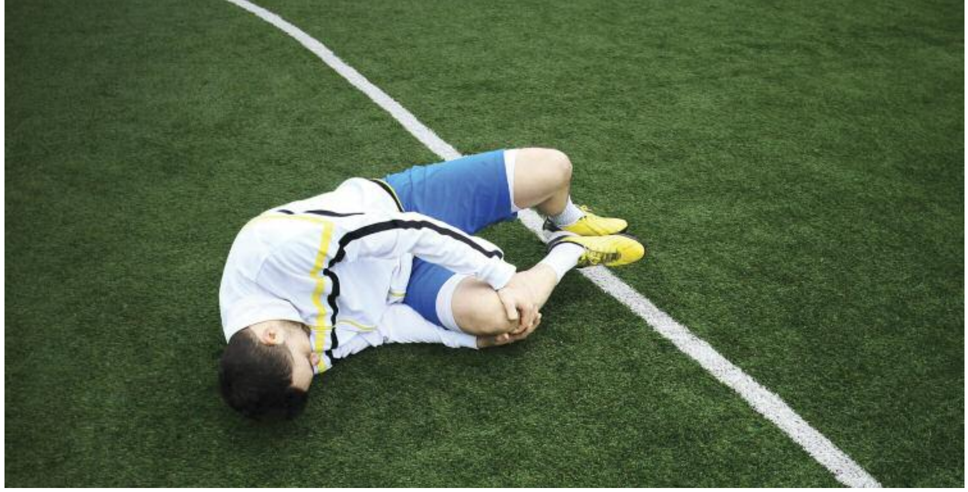

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The STOP Sports Injuries campaign was initiated by the American Orthopaedic Society for Sports Medicine (AOSSM) and includes a comprehensive public outreach program focused on the importance of sports safety—specifically relating to overuse and trauma injuries. The initiative not only raises awareness and provides education on injury reduction, but also highlights how playing safe and smart can enhance and extend a child's athletic career, improve teamwork, reduce obesity rates and create a lifelong love of exercise and healthy activity.

Donate Now

The STOP Campaign needs your support to keep our programs and initiatives moving forward. Donate as little as $10 today to help "Keep Kids in the Game for Life!"

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Helping Muscle Recovery with Electrical Stimulation

By Lee Diehl, MD, and Pat Chasse DPT, ATC

Watching the ESPN CrossFit games last summer, it was interesting how many television advertisements were for home electrical stimulation units being marketed for "recovery." Electrical stimulation machines have been used for decades in collegiate, professional, and Olympic training rooms facilities for decades. Over the past few years it has become increasingly apparent that small, portable devices are making their way into individual athletes' homes and travel bags.

Neuromuscular electrical stimulation (NMES) involves the use of a device that transmits an electrical impulse through the skin via electrodes placed over selected muscle groups. In sports medicine rehabilitation, electrical stimulation is often applied to induce muscle contraction and increase blood flow through tissues. NMES intensity needs to be high enough to induce adequate muscle contraction (muscle pump function) yet not uncomfortable and not so high as to cause increased muscle fatigue.

In order to determine if electrical stimulation can improve recovery, there are a couple things to consider. First your physician or physical therapist must define recovery. In its most basic context, it involves getting the "good stuff in" and the "bad stuff out." Inadequate muscle recovery may impair athletic performance.

Recovery can be a passive process (= rest) or an active process (= movement). Passive recovery and factors that reduce blood flow, like muscle swelling after a workout, may lead to the buildup of metabolic waste and decrease the inflow of oxygen and other necessary nutrients effectively slowing recovery. In contrast, active recovery, often involving mechanical means such as external massage, riding a stationary bike on the sideline, or standing between periods in a match, may facilitate recovery through increasing or maintaining circulation. NMES causes muscles to twitch and may similarly help as an internal massage, increasing blood flow with the bodies' "muscle pump."

Electrical stimulation has proven to enhance blood flow. However, there is a lot of variability between people regarding how much current it takes to stimulate the muscle. This is partly due to variations in fatty and soft tissue between individuals, as well as differences in pain perception. Bodies are different, with differing amounts of muscle. Too little current and it doesn't help. Too much and you risk muscle activation that is counter productive and painful.

Published scientific studies remain unable to show that NMES was more effective when compared to more typical active or passive recovery methods. Future research may shed light on how NMES can best be used. Athletes are always looking for a way to enhance recovery in between competitions or training days in order to improve performance, and as with many aspects of sport—faster can be better. For now however, more research is needed to prove if these machines truly enhance recovery.