Limiting Lower Back Injuries With Proper Technique and Strengthening

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ABSTRACT

THE PURPOSE OF THIS COMMENTARY IS TO PROVIDE A BASIC OVERVIEW FOR COACHES AND STRENGTH AND CONDITIONING PRACTITIONERS TO USE IN COLLABORATION WITH THE ATHLETIC TRAINING STAFF TO MODIFY THE RISK OF LOW-BACK INJURIES IN THEIR ATHLETES. SAFETY, SCREENING, AND STRENGTHENING ARE 3 KEY AREAS DISCUSSED, AND EXAMPLES OF PRACTICAL EXERCISES ARE PROVIDED THAT MAY BE IMPLEMENTED IN A COACHING ENVIRONMENT.

INTRODUCTION

Low-back strains are not an uncommon occurrence and may be the result of poor neuromuscular control (3). Poor neuromuscular control can be improved with the appropriate professionals guiding the individual. Coaches have a responsibility to work alongside the athletic training staff to develop an understanding of guidelines to decrease the risk of lower back injuries. Athletes may need help determining if an issue is a minor strain, delayed onset muscle soreness, or something more concerning that requires consultation with a physician. An example would be a spondylosis, which is essentially a stress fracture of the pars interticularis. Spondylosis-type injuries have a higher prevalence among the athletic population. Assuming the issue is a minor strain, the coach will recognize that the symptoms reside after a few days, and it is at this time the athlete and staff may implement a preventive type program. Although prevention is the key, efforts are usually sought after injury. Generally, all athletes need to pay more attention to strengthen the low back and gluteal musculature and work on activities to improve flexibility of the hips and hamstrings (13,15).

Repetitive strain to the low back without time for the body to accommodate can lead to more serious injuries such as spondylosis (9). Prolonged discomfort may be caused by discogenic pathology, instabilities, or other issues requiring the athlete to seek out a medical professional. It is important not to exacerbate the condition through attempts to prematurely strengthen. If an athlete has spondylosis, rest will most likely be recommended by medical professionals (1). There are various causes of back pain. The exact types will not be discussed in this article. An individual interested in exploring this in more detail should discuss back pain with a qualified medical professional.

For the active athlete, a back injury that affects playing time is not a positive situation. One of the many benefits of performance enhancement exercises is the potential to prevent the prolonged rest necessary from various back injuries. So what is our responsibility as strength coaches? Three primary responsibilities of the strength and conditioning coach are proposed: safety, screening, and strengthening.

SAFETY

As strength and conditioning professionals, one of our major responsibilities is to ensure proper exercise technique is performed with athlete safety as a primary consideration (2). As professionals whose job is to improve performance, strength coaches must consider whether the risk of the exercise outweighs the reward when designing a program. The strength coach must teach and model proper technique for the movement. To maintain a safe training environment, the coach should monitor and correct technique until safe execution has been mastered. When considering low-back injuries and safety, the strength and conditioning professional must constantly watch for improper posture in any exercise.

KEY WORDS:
low-back injuries; screening; core strengthening; exercise
The athletic training or rehabilitation staff should effectively communicate known conditions that may predispose athletes to back injuries during strength and conditioning workouts, which will be discussed further in the screening section. Collaboration and communication between the individuals involved in the athlete’s care and performance will help facilitate proactive action to minimize injuries and keep the athlete fully participating. This environment will increase the ability to keep athletes training safely and possibly reduce preventable low-back injuries.

The athletes may get tired of hearing verbal cues such as “maintain good posture” on a regular basis. At the same time, the coach should explain and demonstrate what this means by helping athletes understand how to maintain a proper lordotic spine and keep the pelvis in a neutral position that does not accentuate anterior or posterior pelvic tilt, especially in end ranges of the squatting motion (6). When issues that need more attention arise from the athletic training staff, there should be collaboration on workout design so that the athlete’s faulty movement patterns can be addressed.

Along with teaching proper technique, the coach should educate athletes on proper spotting. The coach has a responsibility to ensure that every lifter knows the way to spot a lifter so his or her chances of a low-back injury are decreased. Each coach must also decide how much they will expect athletes to use weight belts. The National Strength and Conditioning Association recommends that when combined with proper lifting and spotting techniques a weight belt should be worn if an exercise stresses the low back and there is a maximal or near maximal load (2).

SCREENING
Screening is 1 area where the strength and conditioning staff should intentionally partner with the athletic training staff. Strength coaches are not trained to evaluate injuries, but part of their responsibility is to help prevent injuries through designing safe programs that both enhance performance and prevent injury. (2) The strength coach can help screen athletes for faulty movement patterns or muscular imbalances that could lead to injury. A screening is different than an evaluation that a physical therapist or athletic trainer would perform or a test that examines specific areas. A screening looks at the movement as a whole and may find flaws or “leaks” that could lead to potential injury (7). Whether a coach uses a tool such as the Functional Movement Screen (FMS) (10,17), or their own variation such as a stability ball push-up, or using exercises such as a squat or lunge as the screening, the coach is looking for appropriate mobility in the hip, ankle, and thoracic areas and stability in the torso (8).

If the coach works with small groups and/or can partner with the athletic training staff, then the FMS may be the best option. In larger settings, a coach may have to create or use a validated screening tool that can give a quick perspective of many individuals in a large group. One option is to use part of the warm-up as a screening. Have athletes perform deep squats to get a picture of the hip, hamstring, and ankle flexibility, in-line lunges as Cook describes (8) to look for left-to-right imbalances, and push-ups with 1 leg off the ground will provide a clear picture of an individual’s ability to engage core musculature for stability.

A coach may screen athletes using a validated method such as the FMS (18,19), create a modified version, or even use the technique instruction time to screen athletes for movement deficiencies. Whatever the method, the screening will assure the athlete can move properly and will determine whether mobility or stability issues apart from core strengthening need to be addressed to prevent low-back injuries. Screening and communicating the results with the athletic training staff will provide the coach with qualitative tools to use and help reduce future injuries.

STRENGTHENING
Once the screening has been executed, exercises to correct any imbalances found should be implemented. For example, the multifidus and the transversus abdominis often need to be targeted to help the individual improve cocontraction abilities. Participating in strengthening exercises to correct imbalances or asymmetries may be effective at long-term prevention of low-back pain. (12) This can be as simple as adding extra repetitions on a single-leg squat to help improve

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Figure 1. Bird dog exercise.
an imbalance between the left and right legs. Correctives can be implemented in a large group setting through simple adjustments to the athlete’s normal strength training routine. The athletic training staff can be a valuable source of input on program design when the strength coach may have limited knowledge in certain corrective exercises.

Strengthening and improving core stabilization of the low-back musculature is not limited to unloaded mat exercises. When proper technique is used, many traditional strengthening exercises will improve low-back strength through their stabilizing effect such as the front squat (7) because of the use of the back extensor muscles to maintain an upright posture. Other squatting movements such as a single-leg squat and lunge can also strengthen the back extensors functionally when performed with proper technique. These single-leg exercises can assist in developing lateral hip strength and stability, which may also help with preventing lower back pain. (18) Certain upper-body exercises such as standing shoulder press, which engages the erector spine muscle as stabilizers, or pull-ups and other exercises that strengthen the latissimus dorsi can also functionally improve the spine-stabilizing musculature. This strengthening will occur naturally through bracing the core musculature when performing traditional strength training exercises (14) and maintaining a rigid core when performing weightlifting and associated lifts. (21). With all exercises, both the athlete and coach must pay attention to a tall posture, proper abdominal muscle engagement, and limiting excessive pelvic tilting in either anterior or posterior direction.

After addressing movement imbalances and ensuring proper technique, intentional lower back strengthening should be implemented as a part of the ongoing strength development plan. In the private sector, coaching the minor details of proper lordotic curve, bracing/drawing-in, and preventing excessive pelvic tilt is much simpler than what many strength coaches experience. Many strength coaches work with large groups and have the challenge of trying to teach groups of 20, 40, or more how to keep a lordotic position without the benefit of constant individual attention. In a large group setting, the coach will have to provide much of the feedback combined with peer coaching and kinesthetic cues at times. The rest of this article will provide a few practical exercises, other than the ones previously mentioned, that can be performed with large groups in an attempt to decrease preventable low-back injuries, help teach a lordotic position, and increase the muscular endurance and stabilization of the hip musculature, gluteus, lower back, and abdominals.

Three exercise suggestions that can be used with groups or individuals are bird dog, side planks, and curl-ups (4, 14). Figure 1A and 1B demonstrate the bird dog exercise with the key coaching cues: abdomen pulled in tight to engage the transversus abdominis, back in a natural lordotic position, hips level (standard posture).
coaching cues for many of the exercises are provided in this article, but the strength coach may have to develop different cues that work for the athletes he or she trains. The foam roller on top of the back can be used as a self-coaching tool for the athlete to know if the hips are tilting up or down. To enhance the difficulty, the athlete can hold the position while also drawing shapes such as a square with the extended hand to activate more musculature (16). Figures 2A–C demonstrate a progression for the side plank. The athlete can start on the side of their knee, and then when that position can be held properly for 30 seconds they can move to the edge of their bottom foot. Finally, when that is mastered, the leg can be raised up or even moved behind the body. No matter the position, key coaching cues are hips on top of each other, hips in line with the ankle and axilla, and stomach tight and drawn in with the shoulders back. The coach can provide feedback for the individual through the use of an object such as a stick or wall that would touch if the hips rotate back on a side plank. In a larger group setting, peer coaching can be used by athletes providing feedback to each other if their technique is not correct.

When performing the following exercise, the greatest benefit for the athlete comes from learning how to brace the abdominal and lower back musculature, which involves the muscles that wrap around the torso and function as a natural “belt” for the body known as the transversus abdominis. Improving the endurance in this muscle will help provide a naturally rigid environment for the spine (13). Figures 3A and 3B demonstrate the curl-up in a modified form from what McGill demonstrates (14). The primary coaching cues are stomach tight (brace abdominals), slowly lift each vertebra off the ground, touch fingertips to the top of the patella (no further), and slowly return keeping abdominals braced. Some researchers have found that adding an unstable surface can increase muscle activation, therefore; as an individual becomes proficient on the ground using an unstable surface may help increase the activation of spinal stabilization musculature (20). When the bracing technique has been mastered, an athlete can be encouraged to use it while moving their arms and legs in a controlled manner such as in a bicycle crunch or oblique curl-up. Moving the limbs in this environment will then progress to a braced core while moving during athletic activities such as running. No matter the exercise, proper progression is important.

Three other exercises can also be effective for helping engage the core musculature properly. Dead bugs can be an effective exercise for athletes to learn how to maintain a neutral pelvic position (5). This self-teaching is performed by the athlete placing his or her hands in the lower back at the sides of the spine (Figure 4). Key coaching cues are keep back pressed into hands, move legs slowly, be able to breathe (Figure 5A and 5B). When the exercise can be performed properly with a natural lordosis and stomach drawn in and a neutral pelvis can be maintained, then add arm motions. A plank, where the athlete is holding the position with only their forearms and toes on the ground, requires similar cues to the side plank: abdomen tight, back level, and hips level (11). For a plank, a coach can use both peer coaching and an object on the back such as a foam roll, similar to the bird dog exercise, that will fall if the hips tilt. This will serve as a cue so the athletes know if they are maintaining a level pelvis. Finally, a bridge performed properly can teach the athlete how to engage the gluteus and will help build muscular endurance (11) and the ability for the body to stabilize the hips using the muscles in the gluteal area. First, the athlete should use the pelvic tilt that they learned with the dead bug and then raise his or her hips until they align with the chest and knee. When that posture can be held properly without losing a neutral pelvis, the athlete then lifts a leg not allowing the hips to drop down or tilt to a side (Figure 6).

**PRACTICAL APPLICATIONS AND CONCLUSIONS**

This article has provided exercise options that can be used to assist the strength coach in improving lower
back strength to improve performance and decrease injury risk. The coach continually should focus on proper technique and create a safe environment for training. Second, the coach should collaborate with the medical/athletic training staff to develop the most effective screening process possible.

When implementing these exercises, the practitioner should stay in a general preparation phase or hypertrophy phase for prescribing sets and repetitions. The only load should be the individual’s bodyweight until proficiency and proper technique with no pain is demonstrated, then he or she can add loads where appropriate. The cues provided may have to be modified to meet the learning style of the coach’s athletes.

The high school or collegiate strength coach may have to develop coaching cues beyond what has been provided to help athletes know what to feel and look for in each of these movements and continually communicate because of the coach to athlete ratio. If your athlete has already sustained a lower back injury, collaborate with appropriate medical professionals to determine when a program like this is safe to introduce. The Table provides a starting point for sets and repetitions to use with the exercises suggested in this article. Just like any externally loaded strength training exercise, be certain to correct individuals’ improper form and ensure they perform exercises properly.

Finally, throughout the process, partner with the athletic training staff to help with each phase so the athlete can receive the best coaching possible.

Conflicts of Interest and Source of Funding: The author reports no conflicts of interest and no source of funding.

REFERENCES


