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# Functional Rehabilitation Exercise Prescription for Golfers

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AMATEUR and professional golfers are at risk for injuries to the low back, shoulders, elbows, wrists and hands, and the knees.<sup>1</sup> The lumbar spine is particularly susceptible to injury, due to the shear, compression, rotation, and lateral bending forces created during each golf swing.<sup>1,2</sup> The combination of these forces contributes to golfers experiencing more

injuries to the low back than any other region of the body.<sup>1-3</sup> The golfer's lumbar spine experiences compressive loads during each swing that are approximately 8 times one's bodyweight.<sup>2</sup>

The purpose of this report is to present a functional rehabilitation program for golfers who have chronic low back pain (LBP). Athletic trainers and therapists should consider

the patient's preinjury fitness level and strength and conditioning training habits, as well as the forces exerted upon the lumbar spine by the multiplanar nature of the golf swing, when prescribing rehabilitative exercises.<sup>4</sup>

## KEY POINTS

▶ Successful return of a golfer with low back pain to sport depends on identification of core dysfunctions and implementation of exercises that address them.

▶ A comprehensive rehabilitation approach for golfers with low back pain should include the prescription of functional core exercises

▶ Referral to a professional golf instructor may be necessary to eliminate faulty swing mechanics that contribute to back pain

## Potential Risk Factors

Research evidence and clinical experience suggest that golfers who suffer from LBP demonstrate dysfunctional trunk flexibility and inadequate core strength and endurance.<sup>5-7</sup> There are a few published research reports that have identified predictors of low back injury in golfers.<sup>5-8</sup> Hypomobility has been reported among golfers with LBP.<sup>7,9</sup> Vad et al.<sup>7</sup> conducted a cross-sectional study of hip and spine range of motion in both healthy and previously injured male golfers. Golfers who had previously experienced LBP (for a period of at least 2 weeks) demonstrated a statistically significant association between injury occurrence and decreased lead hip internal rotation, decreased lead hip FABERE distance (FABERE position measurement of the distance from the knee to table surface), and decreased lumbar extension.<sup>7</sup> A golfer with an inadequate amount of lead hip internal rotation will compensate during the golf swing by excessively rotating through the lumbar spine. This compensatory swing pattern increases the stress imposed on the lumbar spine, especially if spinal mobility is limited. Golfers with LBP have also demonstrated increased trunk flexion at ball address and excessive leading side flexion during the backswing.<sup>9</sup>

When a golfer sustains a low back injury, muscle inhibition associated with the injury does not necessarily resolve with the cessation of LBP.<sup>10-12</sup> Golfers with LBP have been found to have difficulty activating the transverse abdominis (TrA) muscle.<sup>5</sup> Evans et al.<sup>5</sup> evaluated the endurance capacity of the TrA muscle in 20 male golfers with a history of LBP and found that it was significantly lower than that measured in a cohort of golfers who had no history of back pain.<sup>5</sup> Lindsay et al.<sup>8</sup> found that golfers with LBP demonstrated significantly less trunk rotator endurance capacity than that of healthy golfers and control subjects. A longitudinal prospective study determined that professional golfers were at risk of sustaining a low back injury if they demonstrated a lateral endurance test performance difference greater than a 12.5 seconds between sides, body mass index less than 25.7 kg/m<sup>2</sup>, and reduced hip flexor length.<sup>6</sup>

### Evaluating Functional Core Strength and Initial Treatment Strategies

A thorough musculoskeletal examination should be performed to identify each patient's unique functional limitations. To evaluate a golfer's core endurance capacity, the core endurance functional tests as advocated by McGill<sup>13</sup> are recommended. Core endurance capacity is assessed by timing the golfer's ability to maintain each of three test positions: (a) the lateral musculature test performed on each side, (b) the flexor endurance test, and (c) the back extensor test. Total endurance capacity and ratios between the tests help to identify dysfunctional components.<sup>1</sup>

McGill<sup>13</sup> advocates an initial rehabilitation strategy to improve the endurance capacity of the core musculature in those who have suffered a low back injury. Along with development of fatigue resistance, immediate rehabilitation interventions should be focused on normalization of any side-to-side flexibility difference. Table 1 presents the components of the initial phase of a return to golf rehabilitation program that is designed to improve core musculature endurance capacity and achieve optimal ratios between groups of muscles. A guide for progression is to first teach awareness of spine position and specific muscle activation, followed by implementation of stabilization activities that build core musculature endurance and establish motor activation patterns and then reinforcing proper muscle activation patterns during functional activities.<sup>13</sup>

**TABLE 1. INITIAL CORE ENDURANCE PROGRAM TO IMPROVE CORE ENDURANCE CAPACITY**

Bird dog	1-2 sets × 10 repetitions
Side planks	2-3 sets × 10 second holds
Crunches	1-2 sets × 25 repetitions
Front planks	1-2 sets × 10 second holds

### Functional Golf Core Training

Once the patient demonstrates improved core endurance scores (Table 2), progression can be made to a functional core conditioning program. Inclusion of functional core exercises is a key to optimal recovery. The golfer's core muscles are responsible for dual roles of creating torso rotation and stabilizing (protecting) the spine from injurious forces.<sup>14</sup> A variety of exercises should be performed, because trunk stabilization requires proper activation of multiple muscle groups.<sup>15</sup> The exercises utilized in this phase of the rehabilitation program should reproduce functional movement patterns. Some exercises are not appropriate for all individuals. Discretion should be used based on the individual athlete when selecting exercises for golf performance and rehabilitation.

Exercises that challenge a golfer's ability to stabilize his or her spine while incorporating functional movement patterns include the lunge twist, the prone twist (Figure 1), the Russian twist (Figures 2 & 3), and kettle ball squats (Figures 4 & 5). Table 3 presents a sample advanced functional core rehabilitation program and Table 4 presents a description of each exercise.

### Including Plyometrics in a Strength Training Program

When the golfer's symptoms have resolved and endurance and strength have been restored, plyometric training should be included in the rehabilitation program. Research has demonstrated that the integration of plyometrics increases club head velocity (CHV) and driving distance (DD).<sup>16,17</sup> Plyometric training may also help to protect the body from potentially injuri-

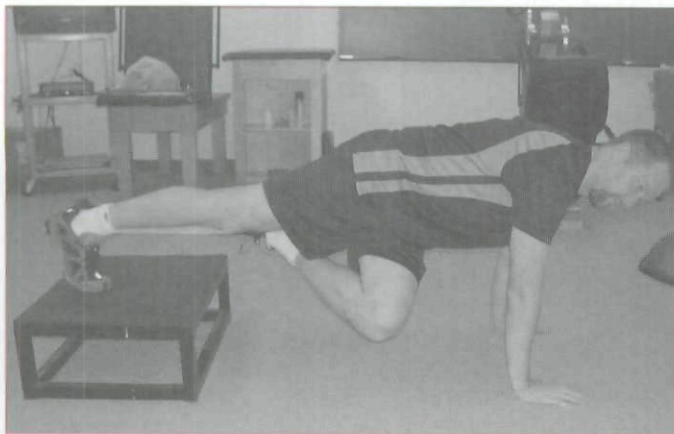


Figure 1 Prone twist.

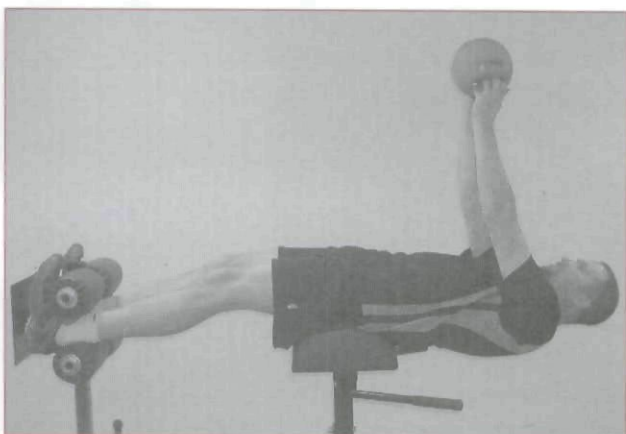


Figure 2 Starting position for the Russian twist.

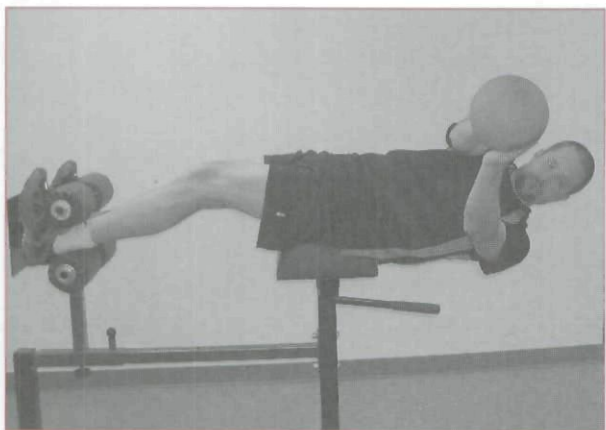


Figure 3 Ending position for the Russian twist.

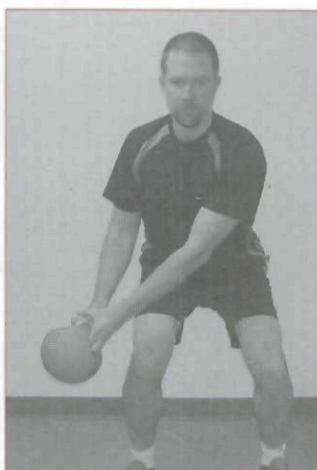


Figure 4 Starting position for the kettle-bell squats.



Figure 5 Ending position for the kettle-bell squats

TABLE 2. PROTECTIVE ENDURANCE RATIOS<sup>1,3</sup>

Right lateral endurance score/ left lateral endurance score	> 0.05
Lateral endurance score (either side)/ back extensor test score	> 0.75
Flexor endurance test score/ back extensor test score	> 1.0

ous forces, thereby reducing the risk of golf-related injury. Standing and seated medicine ball throws have been shown to improve CHV and DD.<sup>16</sup> The program presented in Table 5 may be performed once or twice per week, with 48–72 hours of rest between sessions. The athlete to should be allowed to rest for 1–5 minutes between each exercise.<sup>18</sup>

TABLE 3. ADVANCED FUNCTIONAL CORE TRAINING PROGRAM

Exercise	Sets	Repetitions
Hang twist	2	15
Lunge twist	2	15
Prone twist	2	15
Roman twist	2	15-20
Russian twist	2	15-20
Lat pull down	3	4-6
Kettle ball squats	2	15

Note. An abdominal bracing maneuver should be performed with each exercise. Instruct your athlete/client to co-contract both the abdominals and lower back muscles, making the muscles stiff without creating any movement of the abdominal wall.

**TABLE 4. DESCRIPTION OF GOLFER'S ADVANCED CORE TRAINING EXERCISES**

Exercise	Technique
Hang twist	Grip a pull up bar or the top of a squat rack with a supinated grip bilaterally. Raise the knees toward the right shoulder until thighs are parallel with the floor. Hold for 1 to 2 counts, then lower and repeat to the opposite side.
Lunge twist	While performing the classic lunge exercise, rotate your trunk toward the side of your rear leg. Return to the start position and repeat to the opposite side. A stick can be used to help balance.
Prone twist (Figure 1)	Start with both feet supported on a bench and both hands positioned on the floor, shoulder width apart. Bend one knee to waist height and then rotate the trunk toward the opposite side. Hold up to 5 seconds. Switch legs and repeat to the opposite side.
Roman twist	Incorporating a twisting motion with a roman chair exercise will increase the challenge to the oblique muscles improving trunk stabilization capacity.
Russian twist (Figures 2 and 3)	Position yourself on the roman chair as shown. While maintaining the abdominal bracing contraction, slowly rotate your trunk and arms to the side. Hold for up to 5 seconds. Return to the start position and repeat to the opposite side. To increase the intensity, hold a medicine ball out with straight arms.
Lat pull down	The latissimus dorsi provides power during the forward swing and acceleration phases of the golf swing. Since this muscle is used to provide power, it should be trained with low repetitions and heavy weights.
Kettle ball squats (Figures 4 and 5)	Squat and rotate to grab a kettle ball positioned to the outside of your right foot. As you stand up from the squat position, rotate the kettle ball in a diagonal position across your body to above the left shoulder. Repeat this pattern to each side.
Standing and seated horizontal throws	Position yourself perpendicular to a rebounder approximately 8–10 feet away. While standing or in a seated position, throw a light plyoball or medicine ball across your body toward the rebounder. As the ball rebounds back to you, catch it, and quickly throw it back toward the rebounder. Repeat this sequence for the desired number of repetitions. When sitting on a physio ball, maintain an upright, neutral spine posture.

**TABLE 5. BASIC PLYOMETRIC TRAINING PROGRAM FOR GOLFERS**

Standing horizontal throws (each side)	1-3 sets × 10 reps
Seated horizontal throws (each side)	1-3 sets × 10 reps
Overhead ball throw	1-3 sets × 10 reps

### Swing Considerations

A golfer with chronic LBP may have a faulty swing pattern that imposes stress on the lumbar spine. Referral to a professional golf instructor may help to ensure that a faulty swing pattern does not continually exacerbate low back symptoms. Bulbulian et al.<sup>19</sup> have suggested that a shortened backswing reduces stress to the low back and does not necessarily diminish CHV. Pre-

liminary data from our lab agrees with the finding of McGill<sup>13</sup> that CHV is marginally reduced, but the effect on performance is minimal in relation to the benefit that the golfer may derive in terms of the ability to participate in the game. Another option is to consider a different swing type, such as the two-plane swing described by Hardy.<sup>20</sup> The two-plane swing is believed to minimize trunk and hip dissociation and the “x-factor” compared to the one-plane swing, although no definitive studies have substantiated this claim.

### Conclusion

A comprehensive rehabilitation approach for golfers with LBP should include the prescription of functional core exercises and the referral to a professional golf instructor. Successful return of a golfer with LBP to sport depends on identification of core dysfunctions and implementation of exercises that address them. ■

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