SpineScottsdale Physical Therapy Newsletter

The Arizona Quarterly

Golf Edition

Spring 2010

A Note from Shane

My wife, Emily, and I have just completed our 1st quarter with our new clinic: SpineScottsdale Physical Therapy. We want to thank everyone for your continued support.

The topic of this issue is **Low Back Pain in Golf.** Low back pain (LBP) is one of the most common golf related symptoms, representing from 26% to 52% of all complaints. Understanding how to treat and prevent golf-associated LBP is certainly a worthy endeavor, especially when considering the potential size of the population involved.

Forces on the spine during the golf swing

Although golf may seem less physically demanding than most sports, the golf swing generates a tremendous amount of force. Hosea and Gatt estimated forces on the lumbar spine during the golf swing. Compression loads of up to eight times a person's body weight, or about 6,100 N in amateurs and 7,584 N in professionals, were found to be produced during the golf swing. A study by the same authors using similar techniques measured lumbar compression forces in Division 1-A college football lineman to be about 8,679 N when hitting a blocking sled. This demonstrates the significance of compression forces generated by the golf swing, especially when considering that cadaveric studies showed disc prolapsed to occur with compression loads of 5,448 N.

The facet joints also serve to resist more than 50% of the anterior-posterior shear load. Estimated peak shear loads of 596 N have been recorded during the golf swing in amateur golfers, yet similar shear loads of 570 N were capable of producing pars interarticularis fractures with cyclic loading in cadaver specimens.

In the lumbar spine, rotation is limited by the annulus anteriorly and the facet joints posteriorly. Given the limited range of axial rotation in the lumbar spine and the emphasis on torsional loading during the swing, it's not surprising that the most frequent cause of acute LBP is thought to be local soft-tissue damage; this includes muscle strain, internal disc disruption, and facet joint capsule trauma.

Based on analysis of the forces generated by the golf swing, it its clear how repetitive lumbar spine loads may potentially predispose a golfer to muscle strains, herniated nucleus pulposus, stress fractures of vertebral body and pars interarticularis, spondylolisthesis, and facet arthropathy.

In This Issue:

Modern versus classic golf swing

There are generally two types of swing styles. These are the "modern" golf swing and the "classic" golf swing. The "modern" golf swing emphasizes a large shoulder turn with a restricted hip turn which creates a separation angle known as the "X-factor" (see Fig. 1). The "X" is made by the lines drawn along the axial orientation of the shoulders and hips at the transition between the end of the backswing and start of the forward swing. Lindsay and Horton performed a swing analysis between 12 golfers with and without LBP to look for an association between the "X-factor" and LBP. They found no statistically significant difference in rotation between the groups during their golf swing.

The modern golf swing can also be problematic because of increased lateral bending and exaggerated hyperextension on follow-through, known as the "reverse C" position (see Fig. 2). An epidemiologic and radiographic study of elite golfers by Sugaya et al. found significantly greater trailing side vertebral body and facet joint arthritis when compared with age-matched controls.

The classic golf swing emphasizes reducing the "X-factor". This is accomplished by raising the front heel during the backswing to increase hip turn, shortening the backswing, or a combination of the two. This reduces the magnitude of the hip-shoulder separation angle, and it decreases the torque on the lumbar spine (see Fig. 3). Although one study has shown that a short backswing reduces forces on the trunk and spine, it was found that shoulder muscle activation increased substantially. This may increase the risk for shoulder injury.

In general, a more upright stance in which the golfer is closer to the ball has been shown to prevent LBP in case reports. Studies have demonstrated a decreased stance-to-ball distance may be beneficial because of decreased rotational forces, decreased trunk muscle activity, and decreased lumbar disc pressure.

Fig. 1. Demonstration of static ''X-factor'' (white lines) and dynamic ''X-factor'' (black lines). Note increased hip-shoulder separation angle with opening of hips at start of downswing, leading to supramaximal trunk rotation.

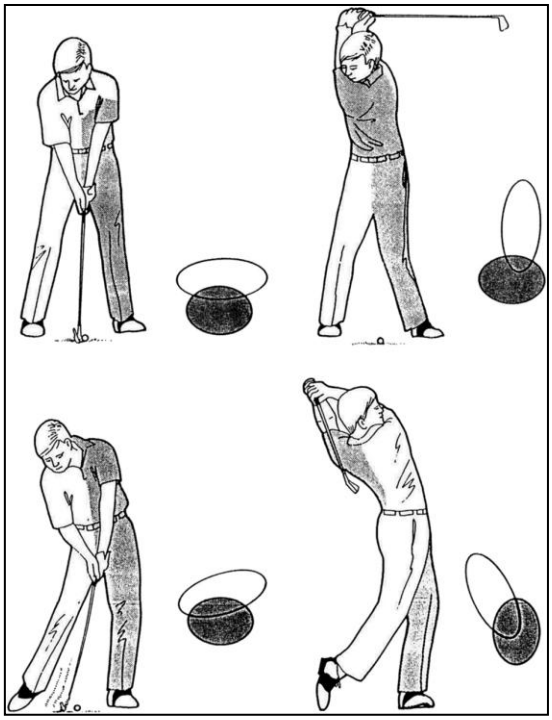


Fig. 2. Modern golf swing. Note the restricted hip turn. (unshaded oval represents shoulder position; shaded oval represents hip position).

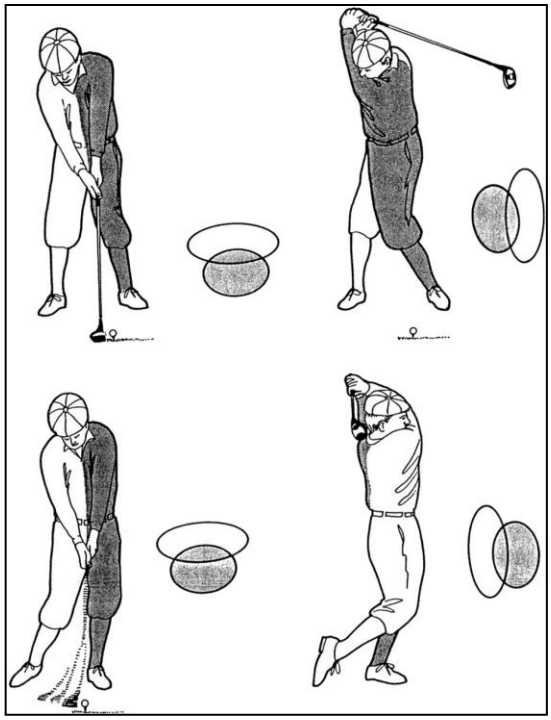


Fig. 3. Classic golf swing. Note the large hip and shoulder turn. (unshaded oval represents shoulder position; shaded oval represents hip position).

Trunk muscle rotation and stabilization

To further understand the biomechanics of the golf swing and to provide a basis for therapy and conditioning programs, EMG analysis on the trunk musculature of golfers and subjects performing axial rotations has been performed. Two studies have focused specifically on trunk muscle activity patterns in different phases of the golf swing. The takeaway phase was found to have to have the lowest muscle activity, and the forward swing was found to have the highest muscle activity

Treatment and prevention strategies

Two studies were identified that proposed programs specifically for the rehabilitation of golfers suffering from LBP. The first was a case report by Grimshaw and Burden on the reduction of LBP in the professional golfer. The 3 month rehabilitation program consisted of:

- Dynamic stabilization exercises involving the transverses abdominus (TA) and multifidi (MF).
- The TA was exercised with light contractions while lying supine with the knees bent.
- The MF was exercised in both prone and quadraped positions through alternating forward flexion of one shoulder and extension of the opposite hip simultaneously.
- These exercises were done 3-4 times each day.
- Each session consisted of 10 repetitions for each exercise.
- Swing coaching served to move the ball closer to the golfer to create a more upright posture.
- In addition, hip-shoulder separation angle was reduced to decrease the “X-factor”.

At the end of the 3 month treatment period, the player had decreased EMG signal intensities throughout the swing and was able to resume golfing without LBP.

Golf and back surgery

No focused research studies exist on when patients can safely return to playing golf after surgery on the lumbar spine. Most surgeons have different recommendations based on their experiences, comfort levels, and fundamental concepts in bony and soft-tissue healing. In general, activity limitations and length of recovery are based on the preoperative condition of the patient and the type of surgery performed. Lumbar discectomy and fusion are two commonly performed procedures that differ significantly in recovery time.

Lumbar discectomy serves to decompress the neural structures by removing the herniated component of the nucleus pulposus. Spine Universe, an online patient resource written by physicians, presents the opinions of a few spinal surgeons who work with golfers. Contributing physicians allow their patients to start swinging a club between 6 and 12 weeks after surgery, depending on their level of skill and progress with low back flexibility and strength training.

Lumbar fusion is a more substantial surgery, and paraspinal muscle dissection is more extensive. Extension bracing is often used for 2 to 3 months after surgery, and activity is limited to walking only. Physical therapy is implemented after radiographic evidence of fusion, and most surgeons interviewed keep their fusion patients from swinging a club until at least 6 to 12 months postoperatively.

SPINESCOTTSDALE PHYSICAL THERAPY

Moving in the Right Direction

What are our patients saying?
The following comments were provided on our Patient Satisfaction Survey:

"After living in pain for two years I found Shane. I feel so much better! I'm now able to walk without pain. Thank you for your compassionate care."
-Frances

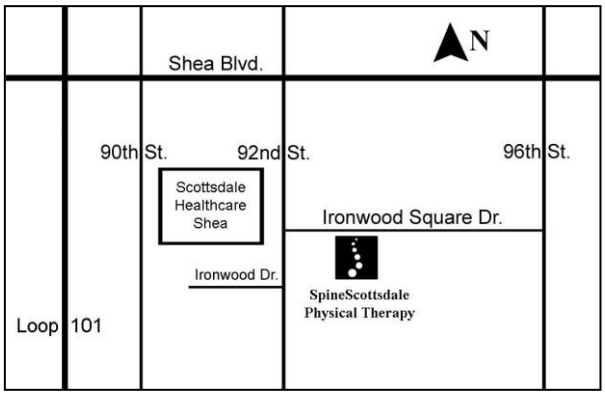
"I'm very glad that I was able to have the physical therapy with Shane. He is very conscientious, knowledgeable, and patient. I would highly recommend him."
-Ruth

"My experience with Shane and the staff at SpineScottsdale has been exceptional. Not only is my chronic back pain gone, but it was also done while making me comfortable and welcome."
-Adam

"I'm very pleased with my physical therapy. Shane has relieved my pain and I feel so much better."
-Donna

"When I came to SpineScottsdale Shane introduced imself and explained the injuries in a manner I understood. We began his routine and within a week I was feeling better than I had in 2 months. My neck and shoulder were free of pain. I enthusiastically would refer Shane to anyone seeking help."
-Margaret

"This is by far the best physical therapy treatment I have ever had."
-James



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