

GOLF INJURIES

WHAT IS THE RISK? WHAT ARE THE MOST COMMON INJURIES?

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INTRODUCTION

Golf is a sport played by more than sixty-six million persons of all ages and abilities globally in over two-thirds of countries and on six continents^{1,2}. Some good news for golfers is that scientific evidence suggests that playing golf is associated with health and well-being benefits by providing physical activity, and potentially improving muscle strength and balance³. Despite the health benefits, players can develop injuries related to golf participation. However, further good news for golfers is that injury rates while playing golf are very low compared to other sports and have been reported as 0.28 - 0.60 injuries per 1000 hours played^{4,6}. A series of 708 amateur golfers reported the most frequent injuries to be located in the lower back, elbow and hand/wrist⁷. Common contributing factors included 'excessive play or practice', 'poor swing biomechanics' and 'hitting the ground'. Gosheger et al. analysed patterns of amateur golf injuries and found 83% of injuries to be due to repetitive motion and 17% to be acute injuries sustained at a single point in time (for example could recall onset of pain after a specific shot)⁸.

Professional golf injuries do have some important differences from amateur injuries. In the same study performed by Gosheger et al., the authors examined

professional golf injuries and found the back, and hand/wrist to be most common. There was a significantly higher proportion of hand/wrist injuries compared to amateurs and a significantly lower proportion of elbow injuries⁸. Sugaya et al. studied the side of lumbar/low back injuries, and found 51% were right-sided pain, 28% reported left-sided pain and 21% reported central or generalised pain. Injury rates in professional players are higher than in amateurs, but relatively lower in comparison to other Olympic sports despite the many hours of practice.

GOLF SWING BIOMECHANICS

The golf swing is a complex, asymmetric movement which includes movement from most joints in the upper and lower limbs as well as the spine. There are typically four major phases to the swing: the address, backswing, downswing and follow-through. The modern golf swing is ideally performed using all major muscle groups, with proximal-to-distal limb sequencing, which increases the speed with which the ball can be hit. Recent golf instruction has made popular the 'X-factor', which is described as a dissociation between the upper and lower body in the downswing. It is thought that this movement increases rotational force and hence clubhead speed and is seen

more frequently in elite players. Movement patterns of the lower limbs, and ground reaction force are the greatest predictors of clubhead speed in the golf swing⁹. With regards to the upper limb, studies have shown subscapularis, latissimus dorsi and pectoralis major to be major drivers of movement in both the backswing and the downswing with supraspinatus, infraspinatus and the deltoid having a much smaller role¹⁰.

INJURY CHARACTERISTICS

Among amateur golfers 16-41% sustain an injury each year, which is lower than the annual rate in professionals (31-90%). This is likely related to different amounts of practice and competition, swing speeds and swing characteristics. Professional golfers typically hit more than 2,000 balls per week with 73% striking 200 balls or more per day on average. In contrast, only 19% of amateurs hit more than 200 balls per week, so the average professional perhaps hits at least 10 times as many balls as the average amateur. The most recent and largest study of amateur golfers by Murray et al reported the most commonly injured body regions to be the lower back (37%), knee (25%) and shoulder (19%)¹¹. The life time risk of injuries in amateur golf is reported to be 25-67% compared to 60-90% in professionals. What



Image: Ankle injury, illustration.

other studies have shown is that golfers often sustain injuries in everyday life (not caused by golf), but that these injuries affect them playing golf. This includes a high proportion of lower back and knee injuries. Injuries in this study were associated with increased age, known osteoarthritis and previous injury. McCarroll & Gioe reported 85% of amateur upper limb injuries were sustained in the lead side, i.e. the left side in a right handed golfer¹². A systematic review of professional golf injuries showed that the most common anatomical location of injuries were the lumbar/lower spine, thoracic spine, cervical spine (neck) followed by the hand/wrist and shoulder¹³.

SPINE

Golfers often complain of back and neck injuries when they present to physios or doctors. These 'spinal' injuries associated with golf can include non-specific pain, muscle strains, herniated discs, stress fractures of the vertebral body or pars interarticularis, spondylolisthesis, and facet joint arthritis. Higher body mass index (BMI), as well as deficits in right sided core strength are more common in golfers with back pain. Sugaya et al. described the 'crunch factor' as a possible cause for lower back pain in golfers. They suggested lateral bending and

axial rotation at the torso produces stresses within the intervertebral discs¹⁴. The authors also showed degenerative changes at the lumbar facet joints of elite golfers that are asymmetrical (right more than left in right-handed golfers). Furthermore, a biomechanical study found that golfers who experienced back pain were more likely to produce greater amounts of rotation during their swing than they could produce under controlled circumstances in the clinic. The authors concluded that those experiencing pain were exceeding their usual range of motion limits using momentum. Spinal injuries in golf can be contributed to by too little or too much mobility issues in other areas, for example a lack of internal hip rotation.

UPPER LIMB

Shoulder

Perhaps not surprisingly given the asymmetric movements, injuries sustained around the shoulder are typically different in the lead and trail side. Lead-sided injuries include acromioclavicular (AC) joint arthritis and posterior instability of the shoulder, which can lead to posterior labral tears. In keeping with other 'overhead' sports, golfers shoulders are prone to impingement, rotator cuff tendinopathy and tears of muscle and

tendon structures. Trail-sided injuries may be related to the excessive external rotation seen in the backswing and early downswing and include instability at the front of the shoulder.

Elbow

Despite the familiar term 'golfers elbow', medial epicondylitis is seen less frequently in golfers compared to lateral epicondylitis ('tennis elbow'). Injuries to the elbow are the 2nd most frequent injury location for recreational golfers, perhaps in part due to sub-optimal swing biomechanics, for example a tendency to "chicken wing" while swinging. Elbow injuries are less commonly seen in elite golfers.

Hand/Wrist

This is the most commonly injured area of the upper limb in elite golfers. The lead wrist is more commonly injured than the trail wrist. With regards to injury patterns, these differ depending on the wrist involved and this is likely related to the difference in biomechanics of each side. Around 2/3 of wrist injuries are lead sided and more than half of all lead wrist injuries in professionals are ulnar sided (the pinkie side of the wrist). These can range from extensor carpi ulnaris tendinopathy to acute subsheath

tears. De Quervian's tenosynovitis most commonly occurs in the lead wrist secondary to repeated ulnar and radial deviation. In the trail wrist, dorsal (back of the wrist) pain is most frequent, including dorsal rim impaction of the wrist joint bones with secondary soft tissue irritation/synovitis and capsular thickening, which can lead to pain and loss of function.

LOWER LIMB

Hip

A study of 109 professional European golfers showed that 19% reported hip pain in the past month, with 12% in the lead hip and 9% in the trail hip. However, labral tears were twice as prevalent in the trail hip compared to the lead hip. Deficits in hip mobility can lead to injuries elsewhere, such as the lumbar spine. Golf is a popular sport in older adults, and those with osteo-arthritis from other causes often complain that this affects their golf. Persons can expect to continue to play golf with hip arthritis, and when hip replacement surgery is undertaken then rehab programs and a gradual re-introduction of golf (starting with putting, then short shots, before full shots) can help persons resume golf and benefit from the healthy physical activity it provides.

Knee

Acute or overuse knee injuries are less commonly caused by golf. However, tears can be seen in the meniscus. Degeneration of this structure may occur secondary to pivoting during the golf swing, typically in the lead knee. More commonly, recreational golfers are likely to experience pain

secondary to aggravating already existent osteoarthritis and careful management can assist these individuals to continue to enjoy the sport. Knee replacements for those with advanced arthritis can help return persons to the sport.

Foot/ankle

Blisters are commonly seen in golfers, particularly at the start of the season or when wearing new shoes. Foot and ankle injuries can also occur secondary to ligament sprains when playing golf or doing other activities like playing football. Ankle ligament sprains are usually more problematic for the lead ankle. The lead ankle at the end of the follow through is inverted and supinated. This motion puts strain through the anterior talofibular ligament. Other injuries can be sustained secondary to long periods of walking over undulating surfaces such as plantar fasciitis and Achilles tendinopathy.

INJURY PREVENTION

The correct kinematic sequence of the golf swing is important for injury prevention in golf. Other throwing sports such as baseball have shown the importance of lower limb mobility and strength as protectors of upper limb injuries in pitchers¹⁵. In golf, this is likely to be very similar and modern day coaching often advises creating power 'from the ground up' i.e. the lower body kinematics driving the swing. All elite players should consider strengthening programs and have kinematic assessments of their swing as part of injury prevention screening and re-assessment in the case of injury. Limitations

in movement such as lead hip internal rotation, a lack of control of movement of the spine, poor core musculature endurance and abnormal muscle recruitment have all been shown to be related to an increased risk of injury. Swing tuition, physical preparation coaches and physical therapists should take these into consideration to help reduce injury risk in golfers. Load management, both in the gym and on the course are core aspects to consider when preventing injury. With the introduction of the International Golf Federation consensus statement on injuries and illnesses in golf, support teams should now be able to accurately monitor injuries and training load in golfers. Other overhead sports such as cricket have clearly documented the risk of injury with increases/changes in training and playing load.

ILLNESS CONSIDERATIONS

The physical health benefits of playing golf include improvements in physical activity levels, blood sugar, cholesterol, and in some studies blood pressure, as well as improvements in respiratory function, muscular function and mental health and well-being. However, golfers are subject to many of the same illnesses that the wider population get, and given golf's popularity amongst older adults, having availability of an Automatic External Defibrillator at golf facilities can save lives. Golf can provide health enhancing physical activity and help prevent and treat mental ill-health. However the professional golfer has similar rates of anxiety, depression, and other mental health conditions as other

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professional athletes, sometimes citing the difficulty of being 'on the road' for more than half of the year, and there only being one winner for each tournament. Anecdotally, hayfever symptoms are common in golfers, particularly during spring and summer.

Sun exposure has benefits listed below

- Stimulates Vitamin D production
- Improved mood, especially early morning sunlight
- Supports functional circadian rhythm
- Reduces the severity of seasonal affective disorder
- Reduction in symptom severity of some common skin conditions

However, the ultraviolet (UV) radiation in sunlight has the potential to be harmful. Recreational golfers receive more UV exposure than non-golfers and there is a modest increase in the rate of basal and squamous cell carcinomas amongst professional golfers and potentially increased risk of malignant melanoma. Golfers are also more prone to the benign adverse effects of sun exposure, such as photoaging. The harmful effects of UV exposure can be moderated by golfers as individuals, golf facilities and the golf industry:

- Individuals – wear sun protective clothing, high sun protection factor sunscreen, and avoid playing during the brightest portions of the day
- Facilities – provide sunscreen, shaded areas and on-site messaging promoting sun safe behaviours

CONCLUSION

While golf has a range of health benefits, injuries and illness can occur. Elite golfers sustain a greater number of injuries compared to amateur golfers however, compared to other Olympic sports this overall incidence is lower per hour played. Spine/back injuries are the most common injuries regardless of playing standard. The golf swing is a complex, asymmetrical movement and injury prevention strategies should consider training load, swing characteristics and physical conditioning.

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