

## Golf-related injuries: case series and reports

### 有關高爾夫球運動的創傷：個案系列及報告

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Within the year 2002, eleven patients attended the emergency department of a public district hospital because of golf-related injuries. This attested to the low but occasionally serious risk of this type of sport activity. As golf is becoming increasingly popular in Hong Kong, it is expected that emergency physicians will see more and more golf-related injuries. (*Hong Kong j.emerg.med.* 2004;11:220-225)

在二零零二年度內，共有十一名因高爾夫球運動而受傷的傷者，到一所地區性公立醫院的急症室求診。證明這類運動危險性低，但偶然也可以相當嚴重。由於高爾夫球運動在香港日漸流行，預料急症室的醫生將會面對越來越多有關高爾夫球運動的創傷個案。

**Keywords:** Accident prevention, athletic injuries, golf, sports, wounds and injuries

**關鍵詞：**預防意外、運動創傷、高爾夫球、運動、傷口及創傷

## Introduction

Golf, an activity that appeared early in the world of sport, is reported to have originated in Scotland and is now a worldwide popular recreational sport.<sup>1</sup> According to an estimate in the early 1990s, there were at least 35 million regular golfers throughout the world.<sup>2</sup> In Hong Kong, the increasing popularity of golf is evident in the escalating number of golf club societies and members. According to the data given by the Hong Kong Golf Association, there were about 66 golf societies and 16,000 registered golf members in Hong Kong in 2002. There were six golf clubs and 10 golf-driving ranges. Besides, there are many golf

courses and clubs in neighbouring cities in China such as Guangzhou, Shenzhen and Zhuhai. Owing to the easy access, golf for leisure or sport has become one of the popular entertainments for Hong Kong people travelling to these areas.

As golf is not a strenuous sport, anyone can participate without gender or age limits. Although golf appears to be relatively benign in its potential for injury, injuries related to playful golf do occur among golfers. Golf-related injuries have been well documented in the literature, mainly from the Western countries.<sup>3-6</sup> However, data on golf-related accidents are scarce in Hong Kong. Information from publications and surveys is limited. Owing to the growing popularity of golf activities in Hong Kong, emergency physicians need to be familiar with golf-related injuries.

The North District Hospital is a public district hospital sited beside the Hong Kong Golf Club at Fanling and near the Hong Kong-Shenzhen 'border'. Eleven cases of 'golf-related injuries' attended its

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Accident and Emergency (A&E) department within the year 2002. The demographic and injury characteristics of the patients are summarised in Table 1. We also report on three interesting illustrative cases.

## Case reports

### Case 1

A 45-year-old male amateur right-handed golfer attended our A&E department with severe left elbow pain after golfing. He played golf once a week. The patient had history of pain in the left lateral elbow, which varied in intensity over the past three months. Physical examination showed that the left elbow was not swollen. However, there was tenderness on palpation around and over the lateral epicondyle. Resisted wrist and finger extension as well as forearm

supination were extremely painful. Cervical examination was unremarkable. X-ray of the left elbow showed no abnormalities. A diagnosis of lateral epicondylitis was made. Initial treatment consisted of rest with elbow splintage together with ice-therapy and analgesic. After two weeks' follow up, there was marked improvement in pain and the patient was referred to physiotherapy for progressive strengthening exercise. The patient was totally pain-free at the sixth-week follow-up.

### Case 2

A 13-year-old girl passer-by was struck on the left eye by a golf club and was seen in our A&E department. She was wearing spectacles and the lenses were fragmented. There was no history of loss of consciousness, vomiting or amnesia after the injury. She complained of pain over the left lateral eyebrow.

**Table 1.** Demographic and injury characteristics of the patients

Patient	Age	Gender	Occupation	Place	Mechanism of injury	Site(s) of injury	Hospitalised (Yes / No)	Treatment	Outcome
1	13	F	By-stander	Hong Kong	Hit by golf-club	Left eye	No	Suture	Discharged from AED No FU
2	22	F	Golfer	Hong Kong	Hit by golf-club	Forehead	No	Suture	Discharged from AED No FU
3	43	M	Golfer	China	Fell from golf-cart	Head, face, left hand, ankle and foot	Yes	Antibiotics Suture Plaster-of-Paris application	Admitted into orthopaedic ward Discharged at Day 14 FU: good recovery
4	45	M	Golfer	China	Sprain	Left elbow	No	Analgesic Physiotherapy	Discharged from AED FU: good recovery
5	70	M	Golfer	Hong Kong	Sprain	Left wrist	No	Analgesic Physiotherapy	Discharged from AED FU: good recovery
6	49	M	Golfer	Hong Kong	Sprain	Lower back	No	Analgesic	Discharged from AED No FU
7	67	M	Golfer	Hong Kong	Sprain	Left elbow	No	Analgesic Physiotherapy	Discharged from AED FU: good recovery
8	25	M	Caddie	Hong Kong	Hit by golf-ball	Sternum	No	Analgesic	Discharged from AED No FU
9	46	M	Golfer	Hong Kong	Fell from golf-cart	Head	No	AED observation	Discharged after AED overnight observation
10	38	F	Golfer	China	Sprain	Right shoulder	No	Analgesic	Discharged from AED No FU
11	53	F	Golfer	Hong Kong	Sprain	Lower back	No	Analgesic	Discharged from AED No FU

AED=Accident & Emergency Department; FU=Follow up

Physical examination revealed a 2.5 cm superficial skin laceration just inferior to the left lateral eyebrow, with no foreign body detected. The orbital rim was normal on palpation. Slit-lamp examination revealed a normal left eye with no hyphema. The lens was intact and clear. Fundal examination was normal and no retinal detachment was observed. Visual acuity of the left eye was normal. X-ray showed no fracture or foreign body in the left orbit. Suturing was done under local anaesthesia. She was then discharged with analgesic.

### **Case 3**

A 43-year-old male amateur golfer fell from a golf cart in Shenzhen City, China. He had multiple wounds and suturing was done in a local hospital there. He was transferred back to Hong Kong and attended our A&E department six hours after the injury. He was alert and conscious on arrival. Multiple lacerations were found on his face and the dorsum of both feet. Tenderness was noted over the left maxilla, left ankle, left foot and the left ring finger. X-rays showed fractures over the head of the left first metatarsal bone, left distal fibula and distal phalanx of the left ring finger. He was admitted into the orthopaedic unit for further management. His wounds were complicated by infection after admission which improved after the use of antibiotics. Dynacast was applied to his ankle and splintage was given to his finger after the infection subsided. The patient was discharged two weeks later with good recovery.

## **Discussion**

The apparent benign nature of golf misleads many health care providers not to anticipate injuries among golfers. Yet wounding does occur in golfers and there is no injury that golfers are immune to.

In our survey, six patients suffered from soft-tissue musculoskeletal injuries arising principally from overuse. In addition to causing new injuries, playing golf may cause recrudescence of old injuries and exacerbate pre-existing degenerative disease. The injuries are often related to adverse golf swing biomechanics. Improper or poor technique also

contributes to these injuries.<sup>5</sup> Although the golf stroke involves the coordinated movement of the whole body; injuries of the hands, wrists, arms, and trunk are more common. Most golfers swing with a right-handed stance, and the left or leading side of the body is more commonly injured than the right or trailing side.<sup>7</sup> The prevalence of injuries, however, varies depending on a number of factors, including the age and gender of the players, their abilities and the frequency of playing golf.

The lateral elbow is more frequently injured than the medial elbow and the most common elbow problem in amateur golfers is lateral epicondylitis in the lead arm.<sup>8</sup> The impact and the act of taking a divot will place a great deal of stress on the extensor carpi radialis longus and brevis muscles. Localised tenderness on the lateral epicondyle and exacerbation of pain with grasping of hands on physical examination are consistent with lateral epicondylitis. Other golfers may suffer from medial epicondylitis (golfer's elbow). This may result from repetitive divot, which causes abnormal forces to be transmitted to the non-dominant elbow. Tenderness on direct palpation and elicitation of pain with resisted palmar flexion of the wrist are common. Conservative treatment includes rest, stretching and strengthening exercises together with the prescription of non-steroidal anti-inflammatory drugs (NSAIDs) for pain control. Resistant cases may require local steroid injection or surgical decompression. The old axiom "to keep the left arm straight" and more flexible shafts, including graphite shafts, may absorb some forces to the forearm on impact.

Wrist and hand injuries are also recognised as one of the most frequent injuries in golfers.<sup>8</sup> Wrist position changes rapidly during the golf swing and a significant force is transmitted from the club head to the hands and wrists on impact. The wrists control the speed of the golf club during its golf swing. In Nagao's study, the club's average angular velocity was 27.6 degrees/0.01 second and the average club-head speed was 46.6 m/second just before ball impact.<sup>9</sup> Golfers may complain of pain over the non-dominant wrist or hand near the hypothenar eminence. Fracture of the hook

of hamate (golfer's wrist), although uncommon, should be excluded. Fracture of the hamate accounts for about 2% of all wrist fractures, but 33% of hamate fractures are found in golfers.<sup>10</sup> It is the most common fracture in golf but the diagnosis is often missed. The injury is caused by one in which the club head strikes a relatively heavy or immovable object, such as a rock or root. The butt of the club is forced against the hypothenar region of the leading hand, breaking the hook of the hamate. Standard radiographs usually will not reveal this injury. Carpal tunnel view of the wrist will help to make the diagnosis. Further imaging techniques such as magnetic resonance imaging or computed tomography are required if the diagnosis is still suspected. Early treatment includes giving a short arm cast for six to eight weeks. Delayed diagnosis may usually require surgical excision of the fracture fragment. Other common hand and wrist injuries such as carpal tunnel syndrome and DeQuervain's tenosynovitis will usually respond to conservative management, which includes rest, physiotherapy and NSAIDs.

In a study of 412 amateur golfers, Jobe and Yocum reported that the back was the most common injury site.<sup>11</sup> On the other hand, in a study of professional golfers, McCarroll and Gioe found that the wrist was the most common injury site, rather than the back.<sup>7</sup> The swing technique used by professional golfers places less stress on the lumbar spine than the amateur's swing.<sup>12</sup> Large lateral-bending shear, compression and torsional forces affect the lumbar spine during the golf swing which may predispose the lower back to injuries. The pain is most likely due to strain, resulting in repetitive minor injuries with periods of exacerbation. Other rare causes include herniated discs, facet arthropathy, spinal stenosis and spondylosis. Conservative measures will usually suffice. Golfers with low back pain may benefit from using one of the newly designed extralong putters and they need to learn to modify their swing technique with less torque in the back muscles.

The shoulder is a commonly injured part in golfers. Since golf is not an overhead sport, acute injuries of

the shoulder are relatively uncommon. Most often, the injuries arise from repetitious shoulder rotation, both at the beginning and towards the end of the golf swing, and are associated with spur formation under the acromioclavicular joint, impingement of the rotator cuff on spurs, and bursal-side partial cuff tears.<sup>13</sup> The non-dominant or lead arm is more often involved. This impingement syndrome, with associated rotator cuff tendinitis or cuff tears, is common in golfers who present with shoulder pain. During physical examination, associated rotator cuff weakness and glenohumeral instability should be excluded. Acute treatment include rest and NSAIDs for pain control. Rehabilitation should aim at strengthening the rotator cuff and the muscles that stabilise the scapula. Golfers may benefit from shortening their swing and flattening their swing plane so as to minimise left arm elevation.

While many previous studies stressed that golf injuries originated from overuse, less emphasis was put on the unawareness of on-field etiquette or rules leading to the risk of serious injuries. Out of the 11 patients in our survey, three patients were struck by golf balls or clubs. This finding is consistent with western studies that, because of disregard of golf rules, being struck by a golf ball or club while playing was the most common cause of injury.<sup>14,15</sup> Moreover, injuries caused by the moving ball or club are particularly serious as nearly one-fourth of the injuries were found on the head and neck regions. The introduction of protective headgear and face shield could probably reduce the severity and frequency of cranio-facial injuries. Golf has also contributed to approximately 2% to 4% of sport-related ocular injuries.<sup>16</sup> In golf-related ocular injuries, the golf ball or club usually hits the eye directly, resulting in rupture of the globe or severe intraocular damage. In our case, the affected site was probably between the globe and the temporal orbital rim, as noted by the superficial skin laceration and ecchymosis over that area. Similar mechanism had been reported that led to avulsion of the optic nerve.<sup>17</sup> Wearing of protective eyewear was recommended to avoid injury. A number of other countermeasures should be considered to protect golfers, spectators and related workers. Some of these may include avoiding

blind spots on fairways and anticipated spectator galleries, and placing general signage, benches and tree markers on the golf course. Needless to say, it is important to educate golf players, particularly those who are new to the sport, to be aware of safety while playing.

Unawareness of some natural environmental conditions for golfers also contributes to golf injuries. In our survey, two golfers fell from golf-carts while driving in rain. It was probably due to the wet, slippery grass and uneven ground surfaces. Similar injuries related to the environment have also been reported in other studies.<sup>5,14</sup> As golfers are fully exposed to the sun with extreme heat, they will suffer from heat-related illness. Appropriate precautions must then be taken. Dress properly with light cotton clothing and a wide-brimmed hat may help. Adequate fluid replacement to prevent dehydration is important on very hot days. There were also reports of fatalities due to lightning strikes on golfers.<sup>14</sup> Inclement weather on golf courses can sometimes be a problem as most areas are exposed with little protection. Golfers should be warned to avoid playing and leave the course immediately when there is lightning or thunder.

Insect stings (e.g. wasps) or animal bites (e.g. snakes) do occur in golfers, especially those straying frequently from the fairway in high-risk geographical areas. Emergency kits should be available to provide first aid to golfers who are allergic to venoms before being transferred to the emergency department. Needless to say, golfers, especially the elderly, are not exempted from common life-threatening medical conditions like heart attacks and strokes.

Adequate emergency and first aid equipment should be available at all golf clubs and courses, irrespective of any emergency situations. All clubs and courses should have a contingency plan that all staff and coaches are well-informed of. Management in case of emergency, selection and maintenance of equipment, administration of first-aid treatment, transport facilities, and training of personnel are all important issues relating to golf course management strategies.

There has been no government publication on the statistics of golf-related accidents in Hong Kong and Mainland China all along. Hence, this is probably the first study done in Hong Kong. However, there were some limitations in this study. The study was carried out in only one local district hospital in Hong Kong. The number of golf-related injury in this one-year study period was obviously an underestimation, as a proportion of the injured might not seek emergency medical attention or seek medical treatment elsewhere. Besides, both severe injuries resulting in fatalities and minor injuries in Mainland China would not be seen here. There was also no data on uninjured persons for control. Thus, the incidence of golf-related injuries and probable risk factors could not be estimated or studied in detail. Nevertheless, our study did show some important findings, which were similar to previous studies in western countries. Further large scale controlled epidemiological studies will definitely help to improve our understanding of golf-related injuries.

In conclusion, golf is a relatively safe sport. Most golf injuries are associated with either repetitive swing and overuse or poor swing mechanics. Physical fitness deficiencies together with inadequate pre-game warm-up exercises predispose golfers to injuries. Lack of etiquette and unawareness of natural environmental conditions also contribute to injuries. Emergency physicians should be familiar with the game's biomechanics and techniques and the patterns of injuries so as to facilitate the diagnosis and treatment of golf-related injuries.

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