Analysis of Paragliding Accidents – A Preliminary Investigation from Nepal

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ABSTRACT

Paragliding, as an adventure sport is considered safe by companies offering the flights; however, paragliding related injuries are not uncommonly encountered in the emergency room. This research was done to study the profiles of victims, circumstances and principal injuries sustained in this sporting activity. The study was conducted at the Manipal Teaching Hospital, Pokhara. Retrospective analysis of records of all the patients injured while paragliding, who were admitted to the Emergency Department of Manipal Teaching Hospital, Pokhara, between June 2012 and January 2015 were included in the study. A total of 15 cases with the history of injury, while paragliding were reported during the study period. Majority of injured were foreign tourists (n=14), males and the mean age of injured was 40.47±11.62 years. Most of the accidents occurred during the months of November and December, and during the landing phase of the event. Most common injuries reported in the study involved the spine and the limbs.Although fatalities are uncommon, proper training of the pilots and use of protective gear is a must in order to prevent injuries during paragliding activity.

Keywords: Adventure sports, Paragliding, Accidents, Spine injuries

INTRODUCTION

Nepal, a small landlocked country provides opportunity for various sporting activities like mountain biking, rock climbing, bungee jumping, zip flying, white water rafting etc. Paragliding was introduced in the country in 1995. Since then, this airborne sport has gained popularity. A paraglider flies downhill with a special parachute like device from the top of a mountain. Ropes referred to gliders guide the direction, speed of fall and also enables a paragliding pilot to stay aloft.[1,2] Most of the paragliding is done within Pokhara valley in Nepal that is a well-recognized destination for free-flight enthusiasts internationally. The place is host to around 250 flights per day during favourable climatic conditions.There are 19 companies offering tandem flights till date where a passenger is tied with a harness to the pilot and paraglides. A free fall from 2000 feet to land on the banks of Fewa Lake completes the jump. Although this adventure sport is considered safe by the companies offering the flights, paragliding related injuries are not unheard of in the emergency room.

The present research assesses the profiles of victims, circumstances and principal injuries sustained in this sporting activity. This study is thee fi rst of its kind, reporting injuries sustained by paragliding enthusiasts in Nepal.

MATERIAL AND METHODS

The study was conducted at Manipal Teaching Hospital, Pokhara that is located within a half hour ride from paragliding sites in the valley and is the first tertiary care centre for the injured seeking medical attention. Retrospective analysis of the records of all patients injured while paragliding who were admitted to the Emergency Department of Manipal Teaching Hospital, Pokhara, between June 2012 and January 2015 were included in the study. Hospital registration numbers of the patients were taken from the emergency department register to obtain the treatment records from medical records department. Patient profile, history of the incident, investigations and treatment data was collected and reviewed.

RESULTS

Patient profile

A total of 15 cases with history of injury while paragliding were reported during the study period. The majority of injured individuals were foreign tourists (n=14) who participated in this adventure sport. Among them, an individual was brought dead to the hospital. The majority of the injured were males (n=13). The age group ranged from 20-63 years, with a mean age of 40.47±11.62 years. Most of the accidents occurred during the months of November and December. The nationality, age, gender, month of the incident and details of serious injury is depicted in Table 1.

Table 1: Patient profile and details of injuries sustained

Country	Age (years)	Sex	Month	Flight Phase	Principal Injury
Australia	38	Male	December	Landing	Abrasions/Contusions
Austria	63	Female	November	Landing	Pelvis and Limb
China	44	Female	July	Landing	Abrasions/Contusions
China	20	Male	July	Landing	Lumbar Spine
Denmark	39	Male	October	Take-off	Face/ Eye
England	38	Male	December	Landing	Abrasions/Contusions
Holland	40	Male	November	Landing	Upper Limb
Iran	47	Male	January	Cruise	Chest Wall/Ribs
Israel	30	Male	November	Landing	Lower Limb
Italy	56	Male	April	Landing	Upper Limb
Korea	43	Male	December	Not known	Fatal (not recorded)
Nepal	21	Male	October	Landing	Thoracic Spine
Russian	49	Male	February	Cruise	Thoracic Spine
Russian	33	Male	February	Landing	Lower Limb
Switzerland	46	Male	April	Landing	Lumbar Spine

Mechanism of Injury

Take-off: A paragliding pilot requires a fast run downhill so that the parachute expands to provide sufficient lift. There was a single case of injury during take-off where the pilot got himself entangled on the glider straps and injured his left eye. He was immediately rescued and further injuries that might have occurred with downhill descent were prevented.

Flight/Cruise: Only two injuries were reported during the flight when the pilot was airborne. One of the victims who happened to be a professional paraglider attempted a rolling stunt about 50 feet above the Fewa Lake, suddenly went off balance and lost control, and fell onto the surface of the water. Another victim fell to the ground when his paragliding equipment deflated as a result of windy conditions.

Landing: The majority of the accidents occurred during the landing phase when there was turbulence or the descent was too rapid.

Injury profile

Spinal injuries were observed in four cases. A Nepalese pilot was the only case amongst the spine related injuries who suffered from neurological deficits (numbness and weakness of the lower limbs) as a result of compression fracture of T12 vertebrae (Figure 1). Other three cases complained of backache but did not show any signs of neurological deficit. Similarly, four victims complained of severe pain over the extremities, two had upper limb injuries andtwo presented with lower limb injuries. Upper limb injuries constituted a fractured clavicle on the right side at the junction of middle and outer third in one case and a dislocated shoulder in the other.Two patients who complained of painful lower limb had a sprained ankle without any associated fracture. A patient who presented with chest pain, was radiographically diagnosed to have fractured 6th to 9thrib on the right side on the postero-lateral aspect. Computerized tomography scan in this patient revealed contused right lung in its lower lobe.The elderly female with pelvic fracture had associated fracture of the calcaneum. One male victim, who got himself entangled on the glider straps while take-off, happened to injure his left eye. Pattern of injury was not available in the case brought dead to emergency department as the deceased was shifted to morgue for further investigations. Remaining patients had external injuries in the form of abrasions and contusions.

Figure 1. Compression fracture of T12 vertebrae sustained during landing

Treatment profile

A thorough investigation was done in all the injured admitted to the hospital. Patients presenting with external injuries in the form of abrasion and contusion were discharged from the ED after appropriate treatment and medication. The case of eye injury was also treated and discharged on the same day. The patients with fractured pelvis, upper limb injuries, chest wall injury and compression fracture of the T12 vertebrae were admitted as in-patients. Patients with upper limb injuries were discharged on the second day of admission. The elderly female with a fractured pelvis along with fractured calcaneum had external brace for immobilization of her hips and a below knee plaster cast. She was discharged on third day of admission on request for further treatment at her home town. The patient with fractured ribs received conservative treatment in the intensive care unit and was discharged on the third day of admission after approval by a panel of doctors that he was fit to fly.The only patient with the longest stay in the hospital as in-patient was the one with compression fracture of T12 vertebrae. He was referred to spinal injury rehabilitation centre in the capital after two weeks of complete bed rest as he had no further complains of numbness in his lower limbs. Operative intervention as a modality of treatment was received by none of the patients in the study group.

DISCUSSION

Demographically, male predominance is seen in this study which coincides with other studies of paragliding injuries.[1,3,4] Most of the incidents in our study were reported during the months of November and December. This is because it is the flying season in Nepal and November and December have the best weather for this sport. The spine is at risk during paragliding accidents as seen in the present investigation. Hasler *et al* (2012) observed spinal injuries followed by injuries to the lower limbs to be common in paragliding accidents.[3] Krüger-Franke *et al* (1991) and Zeller *et al* (1992) found injury to the lower limbs predominated the spinal injuries followed by injuries to the upper limbs.[1,2] Spinal injuries invariably involved the dorso-lumbar region, rarely affecting the cervical spine.[1,4] Injury to the spine is the most common and devastating injury sustained during thisrecreational sport.[5,6] These injuries are not only costlier to treat but also increases the risk of long term permanent disability.[7] Life time cost for paraplegic and tetraplegic patients is estimated to be one million and fi ve million dollars respectively. They also have a reduced life expectancy, deaths commonly occurring within 18 months of injury.[8] Apart from injuries to the spine and extremity, rupture of the aorta is also a reported complication with high mortality rate. Investigations are to be prompted to rule out traumatic rupture of this great vessel in all cases of paragliding accidents.[9] Landing is the most dangerous phase in this sporting event. This observation is in line with some previous studies conducted in Austria, Germany, Norway and Switzerland.[1,2,4] Landing solely depends upon the judgement of the pilot in determining the speed of descent, appropriate landing place and body position. Inappropriate technique of too rapid descent or incorrect body position like straight legs contribute to mishaps as the energy is absorbed through the legs of the pilot.[2] During contact with the ground the axial compression force puts the pilot on greater risk of compression fracture of the dorso-lumbar spine if the pilot is bending forwards. The upward transmitted axial force or landing on buttocks result in pelvic fractures. Landing on the heel increases the risk of fracture of the calcaneum. Bending of the foot at the ankle joint results in ankle injury, due to synergistic effect of compression and rotational forces. Sudden fall on an outstretched hand or fall on a flexed elbow (posture adopted to protect head and face) may result in upper limb injuries.[1] Although the incidence of injury declines once airborne, sudden change in wind speed, failure of equipment, turbulence and stalling may lead to mishaps. Sudden collapse or deflation of the equipment may get a paraglider entangled into the glider straps and sustain injuries. The situation becomes dangerous when a paraglider gets entangled with the straps and spins, as may occur after stalling during landing.[10] Showing off rotatory skills while sailing on air to create adrenaline rush by some inexperienced pilots may also result in accidents, as reported in our study.[11]Paragliding sport usually involves launching from the top of a high hill or mountain.[2] The vicinity where this sporting activity is conducted is remote which hampers swift rescue of victims from the site of the accident.[10,12] Unofficial figures suggest that in the last twenty years, at least 5 fatalities have occurred and more than 20 people have got injured while paragliding.[13] One of the authors personally visited most of the companies offering tandem flights to the public, to inquire about the accidents in the past. All the service providers boasted of having well trained professional pilots and that paragliding was safe when done with their company. They were however reluctant to admit that accidents did happen and if they did it was claimed to have been from their rival companies. Yuill, in 1977, collectively termed injuries sustained during airborne sport as "Icarus's Syndrome". This British neurosurgeon reported of two deaths during hand gliding and opined inexperience as the major cause of accidents.[14] Most of the injuries sustained by the victims were due to high-risks taken by the pilot, which may be considered human error.[11]

Powered paragliding (paramotor) is a further modification of paragliding where the flying equipment is attached to a motor engine. The pattern of injuries sustained during both of these sporting events differ as observed in a comparative analysis of injuries in paragliding and powered paragliding.[15] Landing is the most dangerous phase with more susceptibility to lower limb injuries in paragliding, which requires a downhill descent to take off. In contrast, paramotor can take off from ground without the need of strong winds. Upper limb injuries are more likely in the latter sporting event as a consequence of engine related trauma.

Although fatality is not common, optimal education and proper training of the pilots is a must in order to prevent injuries during paragliding activities.[10-12] Back protection devices, helmets and shock absorbing shoes high enough to protect the ankles should be made mandatory for every pilot.[11] Pre-flight check-up of all the equipment should be routine.[12] All flights should be cancelled in case of bad weather and all flights aloft should be promptly ended.[10]

Even after twenty years since this sporting activity commenced in the country; there is no regulating body in the government to verify the authenticity of the licence acquired by a paragliding pilot. A licence for single or tandem flight can be obtained within the country with merely 5 days training of a basic course. Professional paragliders who visited the country as tourists used to offer training to Nepalese in the past but recently there are hundreds of non-professional pilots embarking illegal and perilous tandem flights in this lucrative business.[13]Training of the pilots from professional and experienced trainers on safe and proper operation of the flights, regular check-up of the flying equipment and flying only on good weather conditions would reduce the number of accidents. Wearing protective equipment so as to prevent major bodily harm would be a wise precautionary measure. Formation of a regulatory body in the government who would take a stringent test to assess the skills of newly trained paragliding pilots and provide them with a licence to fly is the need of the hour.

This study is based on the injured who sought care at Manipal Teaching Hospital, Pokhara. The actual number of victims might be higher than what is observed because there might be cases, who received treatment at other treatment centres. Retrospective analysis of the hospital records and a short study span limited the outcome of the results of the study.

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