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BRIEF REPORT

Traumatic Injury Patterns Associated With Static Line Parachuting

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Objective.—We investigated the incidence and injury patterns of acute parachuting injuries evaluated at a level II military facility during a 5-year period to compile medical information that may assist in improving the safety of parachuting.

Methods.—A retrospective chart review of all parachuting injuries that presented to the Madigan Army Medical Center emergency department in Tacoma, Washington, during a 5-year period from February 2005 to June 2011.

Results.—A total 110 patient charts met inclusion criteria. Lower extremity injuries made up 65% of total injuries, followed by 22% head injuries, 22% neck or back injuries, and 19% upper extremity injuries. One patient died in the emergency department of head injuries, and 1 patient was transferred for an open-book pelvic fracture. The most common phase of the jump in which to sustain injury was at landing. A total of 15 patients were admitted to the hospital. It is of note that some patients had combined injuries. The mechanism of injury documented in 96 of 110 (87%) patients and 10 of 15 (66%) admitted patients was a difficult landing.

Conclusions.—The rate of injury for each area of the body is within previously reported rates, with lower extremity injuries making up the largest category and leading to the majority of admissions. The most common time to sustain an injury was during landing, which represented a majority of both emergency room visits and hospitalizations.

Key words: parachuting, static line, military operations, smoke jumpers

Introduction

Parachuting has been used throughout military history as an effective means of distributing troops to an area of operation. Although this means of deploying troops is quite efficient, there have been significant injuries associated with this method of transportation. In a sentinel study of military parachuting injuries, Kirby[1] suggests it is expected that 0.5% of paratroopers jumping would not be able to carry out their mission owing to injuries. He suggests that poor landing grounds, high wind speeds, and heavy gear contribute to landing injuries that would make soldiers unfit for completing their mission. According to Knapik et al,[2] this risk has been found to be increased by wind speeds over 15 miles/h, landing in trees, colliding with the ground, parachuting at night, experiencing pendulum oscillations caused by the parachute, and by the parachutist being dragged across the ground after landing because of high winds. A study by Kotwal et al[3] examining 4 static line airborne missions conducted by US Army Rangers involving 634 jumpers identified a 12% injury rate with 4% (76 soldiers) requiring medical evacuation and 2% of the soldiers ($n = 11$) requiring surgical intervention. This study identified an 8-fold increase in the percentage of soldiers who were not able to continue the mission as a result of static line parachuting injuries.[3] Although these studies identify factors associated with sustaining injury and incidence of injury, no study has identified the injury patterns associated with static line parachuting.

In military parachuting operations, troops are deployed at low altitudes using a static line parachute, in which the parachutist hooks his or her parachute into a line that deploys the parachute on exiting the plane (Figure 1). Military operations in particular often deploy

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Figure 1. Paratroopers exiting alternately from both rear doors of an aircraft during a static line parachute operation.

troops from both sides of the plane in a procedure termed CAPES (controlled alternating parachute exit system) to deploy a large amount of troops over a small drop zone and decrease the chances that troops become entangled with each other.[2] These deployment techniques, unique to military operations and smokejumpers from the Bureau of Land Management (BLM) and Forest Service, put paratroopers at risk of static line injuries that may result in neck and upper extremity injuries related to discharge from the plane.[4,5] This is in contrast to civilian injuries, which incur the added risk of free falling from a higher altitude than static line parachuting. Free fall parachutists (sky divers) are responsible for deploying their own parachute.[6] Although the military also performs free fall jumps, albeit in much smaller numbers, the static line jump is the primary means of parachuting for mass troop deployments. It is for this reason that we investigated the incidence and characteristics of static line parachuting injuries to determine and describe injury patterns sustained and to use such information to improve identification and treatment of such injuries and possibly mitigate injury in subsequent operations.

Methods

STUDY DESIGN

We did a retrospective chart review of all patients who presented to the Madigan Army Medical Center emergency department from February 2005 to June 2011 by searching our electronic medical record system, *Essentris,* for the clinical data of emergency department patients who sustained acute traumatic parachuting injuries. The medical record system was searched using the terms *paratrooper, parachuting, parachute,* and *trauma* in multiple fields of the medical records. Inclusion criteria for the study were acute traumatic parachuting injuries related to airborne training in the aforementioned 2005 to 2011 time frame. Injuries documented in trauma notes, progress notes, radiographic studies, and discharge summaries were included in the study. Exclusion criteria for the study included patients younger than 18 years and injury that was not sustained during an actual parachuting episode. Patients who presented with nonacute problems related to parachuting injuries, considered greater than 1 week since the parachuting operation, were excluded from the study. We extracted the phase of the parachuting operation in which the patient incurred injury by breaking the jump down into 3 phases: 1) exit of the aircraft until parachute deployment, 2) descent once the canopy opened, and

Table 1. Patient characteristics

Total charts	178
Excluded (nonacute presentations or not parachute-related)	68
Included	110
Sex	
Male	109
Female	1
Age (y)	
20–29	51 (46%)
30–39	39 (35%)
40–49	16 (15%)
50–52	4 (4%)
Timing of Injury	
Exit of aircraft through parachute deployment	9 (8%)
During descent	5 (4%)
Landing	96 (87%)
Disposition	
Discharge	94 (85%)
Admission	15 (14%)
Deceased	1 (1%)