Older Adult Golf Cart and All Terrain Vehicle Related Craniofacial Injury

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ABSTRACT

Outcome Objectives: To analyze the etiologies of craniofacial and temporal bone injury in older adults involved in recreational vehicle trauma.

Methods: A chart review at a level one trauma center from 2000-2012 included 58 patients over 60 years old. Data obtained includes variables: age, gender, race, mechanism of injury, intoxication, hospital stay, vehicle type, Glasscock coma score (GCS), injury severity score (ISS) and helmet use.

Results: Of the 58 patients identified, the mean age was 60.5 years and the majority were white (90%) and male (78%). Eleven patients (19.3%) had a craniofacial injury (CFI) and two patients (3%) had a temporal bone fracture. The most common CFI was an orbital wall fracture (64%), followed by maxilla and nasal bone fracture (27%). Patients with a closed head injury are nearly ten times as likely to incur a CFI (p=0.0034) and those injured while intoxicated were over seven times more likely to have CFI (p=0.0084). Patients with a temporal bone fracture are more likely to suffer concurrent additional CFI (p=0.033). There were no statistical differences on the incidence of CFI in relation to age, race, sex, ISS, GCS or vehicle type. CFI was not a predictor of the length of hospital stay or mortality and helmet use and mechanism of injury are not related to the incidence of CFI.

Conclusions: Recreational vehicle trauma is a risk to older patients. Alcohol is a strong risk factor for CFI. For patients with close head injuries and/or a temporal bone fracture, concurrent CFI should be anticipated.

INTRODUCTION

Golf cart and all-terrain vehicle (ATV) use has increased over the last few decades as a mode of transportation and sport. There are about 78,000 golf carts sold per year and from 2002-2005 there were 48,225 golf cart related injuries (1). In 2011, 10.7 million ATVs were in use and there were 11,686 ATV related fatalities and 107,500 ED treated injuries (2).

Craniofacial injuries are a very common form of ATV and golf cart related trauma, but there is limited research in the older adult population. This population has unique features that may increase risk and severity of injury and affect treatment. General trauma has a greater physical impact on these individuals because of their decreased physical reserves due to conditions such as cardiovascular disease, osteoporosis, and decreased muscle mass. Poor vision, polypharmacy, cognitive decline and arrhythmias may increase their risk of injury (3). Certain drugs such as anticoagulants may complicate treatment due to increased bleeding. Factors such as poor proprioception, weakness, tremor and impaired writing reflexes have been found to be responsible for the occurrence of maxillofacial injuries in older adults (4).

METHODS AND MATERIALS

Following approval of the GRU Human Assurance Committee, a retrospective query of our Level 1 trauma database from 2002-2012 was performed. Patients were then selected using external trauma codes (E-codes) E821-E825 (ATV and other road vehicles) and craniomaxillofacial trauma ICD-9 codes. A total of 58 patients were identified in the initial review. Information reviewed included age and gender, race, injury severity score (ISS), Glasscock coma score (GCS), mechanism of injury, alcohol use, length of ICU stay, length of hospital stay, ventilator days, disposition, helmet use, closed head injury, loss of consciousness, type of CFI, surgical intervention and incidence of death.

For continuous variables, a t-test was performed to assess the difference between those with and without craniofacial injury. A Chi-Square test was conducted to compare the difference between groups. When the assumptions for a Chi-Square test were not met, a Fisher's exact test is conducted. To examine the relationship between ISS and age, a linear regression was performed. Simple odds ratios were assessed for each of the independent variables using logistic regression.

RESULTS

Of the 58 patients identified, the mean age was 60.5 years (SD=9.4) and the majority were white (90%) and male (78%). ATV's were involved in 74% of the trauma studied and golf carts were involved in 26%. See Tables 1 and 2 for descriptive statistics for the variables. Eleven patients (19.3%) had a craniofacial injury (CFI) and two patients (3%) had a temporal bone fracture. The most common CFI was an orbital wall fracture (64%), followed by maxilla and nasal bone fracture (27%). No correlation between ISS and age (p=0.5624) was appreciated.

Temporal bone fracture made up 18% of the CFI. Those with a close head injury (p=0.0346) or intoxicated (p=0.0084) were more likely to have a craniofacial injury. Those with a temporal bone fracture (p=0.0346) were more likely to have concurrent craniofacial injuries. There were no statistical differences on the incidence of CFI in relation to age, race, sex, ISS, GCS or vehicle type. CFI was not a predictor of the length of hospital stay or mortality and helmet use and mechanism of injury are not related to the incidence of CFI.

DISCUSSION

Even though these vehicles have maximum speeds less than motor vehicles, the lack of safety features increases the risk and severity of injury best illustrated by the 1875 pounds of force it takes to fracture the temporal bone (4). The temporal bone fractures were distributed evenly between golf cart and ATV, neither riders were wearing helmets, and both were head on collisions vs. a motor vehicle and a tree, with subsequent ejection.

Orbital fractures were the most common CFI. In previous studies, there are conflicting results in regards to the most common type of facial fracture in elderly trauma through all mechanisms. Maxillary fractures were the most common in Fasola et al (5) and midface fractures were most common in Goldschmidt et al (6).

We were surprised that lack of helmet use was not a risk factor for CFI. In other studies, helmet use while driving an ATV has been found to reduce the risk of mortality by 42% and reduce the risk of head injury by 64% (7).

Thirty four percent patients were under the influence and were more likely to have CFI. This is an important risk factor because intoxication can make treatment more complicated because it has been shown these patients are more difficult to resuscitate (11).

None of our patients required surgery for their CFI. Although the surgical workload due to CFI in older adults in unlikely to increase drastically as the population ages, the overall burden of care of older patients will increase. As a result of extended admission and associate increase in hospital costs. The length of stay for patients with craniofacial injury was longer than those without CFI (p=0.434) with an average of 20 days vs. 10 days.

The most common mechanism that incurred CFI was ejection. This is also a common injury overall for these vehicles due to the lack of seatbelts, especially on golf carts. This data continues to support the argument that increased safety features are needed in both ATV and golf carts.

CONCLUSIONS

As the population ages and becomes more agile in older age, the use of ATV and golf carts will increase among this population. Physicians treating facial trauma need to be aware of the incidence and risk factors associated with trauma due to these vehicles. The most common CFI in older adults was an orbital wall fracture and those with a closed head injury and injured while intoxicated are more likely to incur a CFI. Patients with a temporal bone fracture are more likely to suffer concurrent additional CFI. Helmet use and mechanism of injury are not related to the incidence of CFI.

REFERENCES