

Traumatic Brain Injury Profile of an Elderly Population in Puerto Rico

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Objective: Describe the types of traumatic brain injury secondary to falls sustained by the members of an elderly population who received services at the Puerto Rico Medical Center and the demographic profile of that population.

Methods: A group of 332 adults (60 years and over) assessed for traumatic brain injury secondary to falls suffered in 2013 were included in the analysis. The cases were retrieved from the computerized database of the Neurosurgery Section. We analyzed information such as age, gender, type of traumatic brain injury, mechanism of injury, and the performance of surgery (if applicable). Descriptive analysis was performed to derive a general profile of elderly adults who presented with traumatic brain injury secondary to falls.

Results: The sample consisted of 332 elderly adults: 73% were men and 27% were women. The mean age was 76.74 (SD=9.95) years: 75.67 (SD=9.78) for men and 79.13 (SD=10.02) for women. The most common traumatic brain injury was subdural hematoma (51%) and the mechanism of injury most prevalent was the ground-level fall (83%). Other traumatic brain injuries included traumatic subarachnoid hemorrhages (14%), cerebral contusions (18%) and epidural hematomas (3%). Of all the cases, 52% had were managed surgically.

Conclusion: The elderly population is growing and the risk of falls increases with advancing age. Recurrent falls are an important cause of morbidity, and mortality rates oscillate from 6 to 18%. Elderly patients have longer rehabilitation times, incur more expenses, and have greater levels of disability. This study provides a platform for future epidemiological studies to help develop strategies for the prevention of traumatic brain injury in older adults. [*P R Health Sci J* 2017;36:237-239]

Key words: Traumatic brain injury, Elder adults, Acute subdural hematomas, Ground-level falls

Traumatic brain injury (TBI) is associated with decreased consciousness, cognitive or neurological abnormalities, skull fractures and/or intracranial lesions (1, 2, 3, 4). TBI secondary to a fall is common among the elderly, who also are more prone to falls than are younger adults. This represents a challenge for the clinician due to an increased risk of poor neurological and neuropsychological recovery in this population (5, 2).

The elderly population in Puerto Rico has been increasing over the years, a trend that is linked to changes in the demographic variables of birth, death and migration (6, 7). According to the census data of 2010, in Puerto Rico, a total of 760,075 adults over 60 years or more were reported, representing 20% of the total population (8, 7). This proportion is expected to increase to 24% of the population by 2025 (8).

Approximately 8% of people aged 65 or more visit emergency rooms each year because of an injury. About one fourth of all consultations in emergency departments are related to falls; three-quarters of emergency room consultations are due to

falls in patients aged 75 years and older (9, 1, 10, 11, 12). Approximately 10% of falls in elderly adults, result in injuries, the most common being a TBI (11). Therefore it is important to study the epidemiologic variables in this group to establish lines for appropriate treatment and prevention.

Research has shown that TBI potentially requires long-term care. This kind of care results in high economic costs to the health system. These costs are estimated annually at \$60 billion (10).

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For this reason the World Health Organization recommends the development of surveillance and epidemiological programs to measure the impact of TBI among the world's population, in order to guide and develop efforts to promote more effective methods of prevention.

Methods

This study was approved by the University of Puerto Rico Medical Sciences Campus and the School of Medicine's Institutional Review Board (A0230114). The cases were retrieved from the computerized database of the Neurosurgery Section at the Medical Sciences Campus. The inclusion criteria were that the potential participant be 60 years of age or older, have been diagnosed with TBI (resulting specifically from a fall), and have received neurosurgical services during 2013; 332 patients met these criteria. The data were analyzed using SPSS version 20. The following types of TBI were included in the analysis: subdural hematoma (SDH), epidural hematoma (EDH), cerebral contusions (CTX), traumatic subarachnoid hemorrhages (t-SAH) and multiple trauma.

Demographic information (age and gender) was collected from all the patients. We divided the patients into 3 age groups consisting of patients from 60 to 74 years of age, from 75 to 84, and 85 and older. In addition, we evaluated data regarding the type of TBI sustained by each patient, the mechanism of that injury, and (when applicable) the surgical management of the injury. Descriptive analysis was performed in order to derive a general profile of elderly adults who present a TBI secondary to a fall.

Results

The total sample for this study consisted of 332 elderly adults (73% were men and 27% were women) (Table 1). The mean age was 76.74 (SD = 9.95) years, with the mean age for males being 75.67 (SD=9.78) and for females was, 79.13 (SD = 10.02).

Table 1. Demographic characteristics of older adults with a traumatic brain injury secondary to falls (n = 332)

Variable		N (%)
Gender	Male	243 (73)
	Female	89 (27)
Age (years)	60 - 74	139 (42)
	75 - 84	113 (34)
	85 and up	80 (24)

TBIs were divided into 5 categories. These categories were the following: SDH, EDH, CTX, t-SAH, and multiple trauma; included in the last category were injuries that comprised 2 or more types of TBI, most commonly consisting of combinations of SDH, CTX, and t-SAH.

The most common mechanism of injury was the ground-level fall (83%) (Table 2). Other types of mechanisms of injury included fall from an unspecified level (14%) and multiple falls (3%). TBIs secondary to falls included SDHs (51%), EDHs (3%), CTXs (18%), t-SAHs (14%), and multiple falls (14%).

Table 2. Mechanism of injury (n = 332)

Mechanism of injury	N	(%)
Ground-level fall	276	83%
Fall from unspecified level	46	14%
Multiple falls	10	3%

The general results indicated that the SDH had the greatest incidences: 45% in women and 53% in men. The ground-level fall was the most common mechanism of injury: 85% in women and 82% in men. Surgical management was required by 51% of the women patients and 42% of the male patients.

As a result of their having sustained a TBI, 52% of patients required surgery. In regards to the type of TBI and the concatenate need for surgery, we observed that 30% of the patients who had SDHs required surgery.

Discussion

Census data demonstrated that the elderly population in Puerto Rico is growing, which is significant given that the risk if falls increases with advancing age (10, 11). Recurrent falls are an important cause of morbidity and mortality in the elderly and are associated with poor cognitive condition, orthopedic/mobility issues, and neurologic and cardiac diseases (1, 10). The mortality rate in elderly patients sustaining ground-level falls is reported to be from 6% and 18% (6). In hospitalized elderly patients with TBI, the rate of mortality is highest for SDH (33%), followed by that of CTX (25%)(2); these 2 categories represented the most common manifestations of TBI in our study. In the US, 30% of individuals 65 years old and older fall at least once a year (13, 1, 14, 2). Falls are one of the most common causes of TBI in this population and therefore are an important cause of increased visits to the emergency room that can lead to hospitalization and surgery (9, 5). Our study reveals that a high number of elderly patients presented at the Puerto Rico Medical Center with TBI (332 patients in 2013); of them, 52% required surgical intervention. In most of those cases, the mechanism was a ground-level fall (83%).

The economic consequences are alarming: Every year the costs associated with of TBI reach approximately \$60 billion in the United States. When the injury types and severities are compared to those of other age populations, I can be seen that elderly patients have longer rehabilitation stays, higher rehabilitation costs, and greater levels of disability (15, 5). Investment in proven strategies to prevent falls and injuries is essential for maintaining independence and quality of life in elderly adults.

Multifaceted programs that include regular exercise, visual evaluation and correction, medication review and adjustment, and environmental modification are needed. Meeting the challenges presented by this need requires a clear understanding of the prevalence and nature of falls, innovative planning to develop prevention programs, systems and structures that will support fall prevention initiatives, and substantial reforms and policies at local and national levels (11, 4).

This is the first study that describes the nature and trends of TBI secondary to falls in the elderly in Puerto Rico. We aim to provide a platform for future epidemiological studies, and to help devise strategies to prevent TBI in elderly adults.

Resumen

Objetivo: Describir el perfil demográfico y el tipo de traumatismo craneoencefálico (TCE) secundaria a caídas en la población de adultos mayores que recibieron servicios en el Centro Médico de Puerto Rico. **Métodos:** Se estudió un grupo de 332 adultos mayores con TCE secundario a caídas ocurridas durante el año 2013. Se utilizó la base de datos de la Sección de Neurocirugía, donde se analizaron las siguientes variables: edad, género, tipo de TCE, mecanismo de la lesión y el manejo quirúrgico (de ser requerido). **Resultados:** Con una muestra de 332 adultos mayores, 73% varones y 27% mujeres. Con una edad media de 76.74 (SD = 9.95) años, 75.67 (DE = 9.78) para los hombres y 79.13 (SD = 10,02) para las mujeres. El TCE más común fue el hematoma subdural (51%) y el mecanismo de lesión más frecuente fue la caída a nivel de los pies (83%). Otros tipos de TCE incluyen hemorragia subaracnoidea traumática (14%), contusiones cerebrales (18%) y hematoma epidural (3%). El 52% de los casos tuvo un manejo quirúrgico. **Conclusión:** La población de adultos mayores está creciendo y el riesgo de caídas aumenta con la edad. Caídas recurrentes son causa importante de morbilidad y de mortalidad, las tasas oscilan entre 6% y 18%. Los pacientes de edad avanzada tienen periodos de rehabilitación más largos, se incurren en más gastos, y tienen mayores niveles de discapacidad. Este estudio proporciona una plataforma para contribuir al desarrollo de estrategias para la prevención del TCE en adultos mayores.

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