Current Epidemiology of Genitourinary Trauma

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KEYWORDS

• Urologic • Trauma • Epidemiology • Kidney • Ureter • Bladder • Urethra • Genitalia

KEY POINTS

- With 10% of the 2.8 million trauma patients hospitalized yearly in the United States sustaining genitourinary injuries, an understanding of the epidemiology of genitourinary organ injury facilitates prompt diagnosis and appropriate treatment of these injuries.
- The use of national data sets to conduct large population-based studies has increased our understanding of the epidemiology of genitourinary trauma.
- Most renal, bladder, and posterior urethral trauma is from blunt mechanisms, most commonly motor vehicle collisions.
- Most ureteral and anterior urethral injuries are iatrogenic.
- Research and development of safer vehicles along with public efforts and policy to create safer roadways and regulate hazardous driving activities continues to decrease morbidity and mortality from motor vehicle collisions.

INTRODUCTION

The importance of recognizing and appropriately managing urogenital injuries has been appreciated for centuries. Timely identification and management of these injuries is often organ saving, and at times, life saving.

Worldwide, trauma is currently the sixth leading cause of death, accounting for 10% of mortalities.[1] In the United States, more than 2.8 million people are hospitalized as a result of trauma yearly, with estimated costs of $406 billion annually in medical expenditures and lost productivity.[2] Trauma has a predilection for young adults and results in the loss of more productive work years than cancer and heart disease combined.[3] The urogenital system has consistently been shown to be involved in 10% of patients presenting after trauma and is therefore a significant factor in trauma-induced morbidity and mortality.[4]

Most trauma data from the 20th century were reported from single-institution data sets. With the expansion of electronic medical records and national trauma networks, national data sets have become a more accessible and significant source of information.

The National Electronic Injury Surveillance System (NEISS), originally created in 1970 by the US Consumer Product Safety Commission, is one example of these national data sets. It has been used primarily to evaluate the magnitude of injury associated with consumer products, but because it provides a national probability estimate of all injury-related US emergency department presentations, it has proved to be a useful tool for evaluating many facets of trauma epidemiology.

More recently, the National Trauma Data Bank (NTDB), created in 1989, has continued to grow exponentially and currently contains more than 5 million records, making it by far the largest national data set available. It has been increasingly analyzed over the last 2 decades, resulting in significant contributions to the medical literature

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and increased understanding of trauma incidence, mechanism, and outcomes.[5]

The Crash Research and Engineering (CIREN) database, which is a multicenter research network developed by the National Highway Traffic Safety Administration, provides detailed crash site analysis and specific occupant injury data to help researchers better understand the mechanisms of injury in motor vehicle collisions (MVC).

Although far from comprehensive, these are several important examples of the major data sets relating to trauma. In the future, as the evaluation and sharing of data become easier and faster, the continued development of more inclusive and refined data sets will enable researchers to probe further into the epidemiology and, hopefully, prevention of trauma.

ORGANS

Kidney

Prevalence/incidence

Renal injury has historically been reported in 1.2% to 3.3% of trauma patients depending on the data set.[6–8] A recent population-based study using the NTDB and consisting of 6231 renal injuries found an incidence of 4.9 per 100,000 population.[9] Like other trauma, renal injuries are also associated with youth and male gender. Renal injuries occurred in patients less than 44 years of age 70% to 80% of the time and almost 75% of these were male.[9]

Mechanism

In the United States, 82% to 95% of renal injuries are secondary to blunt trauma,[9] slightly less than the 93% observed in Canada[8] and 97% in Europe.[10] Penetrating injuries are more prevalent in undeveloped countries and areas with civil unrest. A retrospective, 4-year single-institution study from a hospital serving 13 smaller cities throughout southeastern Turkey, a region with elevated sociopolitical tensions and a gun in every residence for self-defense and hunting, reported 59% (42/71) of renal injuries were secondary to gunshot wounds (GSW).[11] Similarly, 75% (130/174) of renal injuries reported by one hospital in Durban, South Africa were from a penetrating source, with 50% (87/174) caused by GSW.[12] Although penetrating renal injury, which is responsible for 16% of renal injuries per review of the NTDB, is much less common than blunt renal trauma, the incidence of civilian GSW is reportedly increasing in the United States, Africa, and some European countries.[9,13] Of traumatized patients in the United States, the proportion with renal injury was highest in those sustaining injuries from firearms (3.5%), MVC (2.2%), bicycle accidents (1.9%), pedestrian accidents (1.5%), stab wounds (0.8%), and falls (0.5%).[9]

The epidemiology of renal trauma—Summary of multiple series

	Rate of Renal Injury (%)	Number	Blunt (%)	Penetrating (%)	Minor Injuries (%)	Major Injuries (%)[a]	Renal Exploration (%)	Nephrectomy (%)
Seattle[7]	2.8	154	93.5	6.5	92	8	N/A	3.8
Toronto[14]	3.25	132	95.4	4.6	72	28	7.4	3.2
San Francisco[6]	N/A	2254	89.8	10.2	91.1	8.9	7.4	0.8
British Columbia[8]	1.4	227	93.4	6.6	81.7	18.3	7.1	N/A
NTDB[9]	1.2	6231	81.6	16.0	82.5	17.5	13	7

[a] Major injury defined as AAST grades 2 to 5 or ICD-9 code for laceration, parenchymal disruption, or vascular injury.
Data from Wessells H, Suh D, Porter JR, et al. Renal injury and operative management in the United States: results of a population-based study. J Trauma 2003;54(3):423–30.

Motor vehicle collisions

MVC account for approximately 70% of blunt renal injuries, with 50.9% involving 2 vehicles, 21.1% involving a solitary vehicle, and 11.1% involving vehicle versus pedestrian.[15,16] According to the World Health Organization, approximately 1.3 million people die yearly from road traffic accidents, and another 20 to 50 million suffer nonfatal injuries.[17] Ongoing research into preventative measures to lessen solid organ injury has provided insight into the mechanism of renal injury in various MVC scenarios, as well as the effects of multiple automobile safety features.