



Genitourinary injuries following road traffic collisions: a population-based study from the Middle East

Karayolu trafik kazalarına bağlı genitoüriner yaralanmalar:
Orta Doğu'dan nüfusa dayalı bir çalışma

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BACKGROUND

The epidemiology of trauma to genitourinary (GU) organs following Road Traffic Collisions (RTC) is not well-studied, especially in the Middle East.

METHODS

The data of the RTC Injury Registry in Al-Ain City were collected prospectively from April 2006-October 2007.

RESULTS

Of the 1,008 patients in the registry, there were 23 GU injuries. Renal injuries accounted for 74% of injuries. Of these, 35% were severe (grade IV-V). There were two extraperitoneal bladder injuries and two membranous urethral injuries, all of which were associated with pelvic fractures. In addition, there were two asymptomatic adrenal injuries. The mean Injury Severity Score, mean total hospital stay and percentage of patients who required intensive care unit (ICU) admission were higher in patients with GU injuries compared to non-GU patients (24.9 vs. 9.0 ($p<0.0001$), 24.1 vs. 8.9 days ($p<0.0001$) and 67% vs. 17% ($p<0.0001$), respectively). Side-angle collision was the primary crash mechanism in 39% of GU patients vs. 16% in non-GU patients ($p=0.015$).

CONCLUSION

This is the first population-based study of GU injuries following RTC from the Middle East. Patients with GU organ injury tend to have more severe trauma compared to other patients. The incidence of GU injuries following RTC in the current study appears to be higher than that reported in the West.

Key Words: Genitourinary injuries; road traffic collisions.

AMAÇ

Karayolu trafik kazalarını (KTK) takiben oluşan genitoüriner (GÜ) travmaların epidemiyolojisi, özellikle Orta Doğu'da üzerine eğilinmemiş konulardan biridir.

GEREÇ VE YÖNTEM

Nisan 2006-Ekim 2007 tarihleri için Al-Ain şehri KTK yaralanma kayıtları geriye dönük olarak değerlendirildi.

BULGULAR

GÜ yaralanma 1008 hastanın 23'ünde vardı. Renal yaralanmalar, tüm yaralanmaların %74'ünü kapsıyordu. Bunların %35'i şiddetli idi (evre IV-V). Hepsisi de pelvis kırıkları ile birlikte olan 2 ekstraparitoneal mesane yaralanması ile 2 membranöz üretral yaralanma mevcuttu. Buna ek, 2 asemptomatik sürrenal yaralanması da vardı. Ortalama Yaralanma Şiddet Skoru, ortalama toplam hastanede kalma süresi ve yoğun bakım ünitesine yatırılması gereken hastaların yüzdesi, GÜ yaralanması olmayan hastalara kıyasla GÜ yaralanması olan hastalarda daha yüksekti (sırasıyla, 9,0 ve 24,9 ($p<0,0001$), 8,9 ve 24,1 gün ($p<0,0001$), %17 ve %67, ($p<0,0001$). Yan açılı çarpışma, GÜ yaralanması olmayan hastalardaki %16'ya kıyasla GÜ yaralanması olan hastalarda %39 ile primer yaralanma mekanizması idi ($p=0,015$).

SONUÇ

Bu çalışma, Orta Doğu'da KTK'yı takiben oluşan GÜ yaralanmaları ile ilgili olarak gerçekleştirilen ilk nüfus esaslı çalışmadır. GÜ organ yaralanan hastalar, diğer hastalara kıyasla daha şiddetli travmaya sahip olma eğilimindedirler. KTK'yı takiben oluşan GÜ yaralanmalarının görülme sıklığı, Batı'da rapor edilenlerden daha yüksek gibi görünmektedir.

Anahtar Sözcükler: Genitoüriner yaralanmalar; karayolu trafik kazaları.

Road traffic collision (RTC) is the most frequent cause of genitourinary (GU) injuries in patients with severe trauma.^[1] One of the very few studies in this field was the one performed by Paparel and colleagues,^[2] who reported a 0.46% incidence of GU organ injury among more than 43,000 victims of RTC in France. However, the incidence and the nature of GU injuries after RTC in other parts of the world such as the Middle East are not well studied. Obviously, the driving conditions are different from those in the West. In addition, the compliance of drivers with safety measures is much lower.^[3,4] Indeed, in one of the reports from the Middle East, only 25% of drivers who were involved in RTC used seatbelts.^[4] Therefore, the incidence and nature of GU organ injury in the Middle East could possibly be different from those observed in the West.

We aimed to study the incidence and nature of GU injuries under such conditions using our RTC Injury Registry.

MATERIALS AND METHODS

The data was collected prospectively from the Road Traffic Collisions (RTC) Injury Registry in Al-Ain City from April 2006 to October 2007. The registry involved the two main hospitals in the city, Tawam and Al-Ain Hospitals. Al-Ain City, which is the largest city in the Eastern District of Abu Dhabi and one of the four largest in the country, had a population of 450,000 at the time of the study. The registry included all patients who were admitted to the hospital or died in the Emergency Department.

The data collected included the patient's age, gender and other personal details. It also included the type of vehicle (s) involved, the status of the patient in the vehicle at the time of the crash, the exact mechanism of crash and injury, the use of safety measures, GU injuries, other injuries, the status of the patient at the scene and upon arrival to the emergency room, the Injury Severity Score (ISS), the procedures required, and the final outcome. The ISS was used as a global measure of injury severity. ISS was calculated manually using the Abbreviated Injury Scale handbook.^[5] ISS is an anatomical score, which provides a single aggregate number that combines all injuries of the body. It is derived from the Anatomical Injury Score (AIS), which divides the body into six separate anatomical regions and assigns each a severity score that ranges between 1 and 5. The ISS is calculated as the sum squares of the three highest AIS scores from different regions, and it ranges between 1 and 75.^[6]

Trauma to the adrenals was considered to be a urological injury. Renal trauma was classified according to the scale of the American Association for the Surgery of Trauma.^[7]

A web-based database was used to enter the data. Statistical analysis was performed using SPSS V15.0. Univariate analysis to compare patients with or without urological injuries was done using Mann-Whitney test for continuous or ordinal data and Fisher's exact test for categorical data.

RESULTS

Of the 1,008 patients who were studied, there were 18 patients with urological injuries, with an incidence of 1.8%. Five of these patients had injuries to two GU organs; thus, there were 23 injuries in total. The mean age was 23.1 years (range: 4-40 years). Two of the patients were younger than 18 years. There were 16 males and 2 females.

As shown in Table 1, which illustrates the GU organs involved and the type of injuries, renal injuries accounted for 74% of all injuries. Six renal injuries (35%) were severe (grade IV and V), for which two patients required nephrectomy (Fig. 1). Both bladder injuries were extraperitoneal and were associated with pelvic fractures. Similarly, the two membranous urethral injuries that involved complete disruption of the urethra were associated with severe pelvic fracture. One had an early realignment and the other had a delayed repair. The two adrenal injuries consisted of adrenal hematomas, which were asymptomatic.

The mean ISS for the GU patients was 24.9 (median: 29, range: 5-50) compared to 9.0 (median: 5, range: 0-45) for patients with non-GU injuries ($p < 0.0001$). Similarly, the total hospital stay was higher in the first group (mean: 24.1 days; median: 24; range: 2-68) vs. 8.9 days (median: 3.0; range: 1-127) in the non-GU injuries ($p < 0.0001$). In addition, the percentage of patients who required intensive care unit (ICU) admission was higher in GU patients compared with patients with no such injuries (67% vs. 17%, $p < 0.0001$).

Table 1. Type and grade of genitourinary organ injuries in RTC

Genitourinary organ injury	No
Renal	17
Grade I	4
Grade II	4
Grade III	3
Grade IV	4
Grade V	2
Bladder	2
Extraperitoneal	2
Intraperitoneal	0
Membranous Urethra	2
Adrenal	2
Total	23

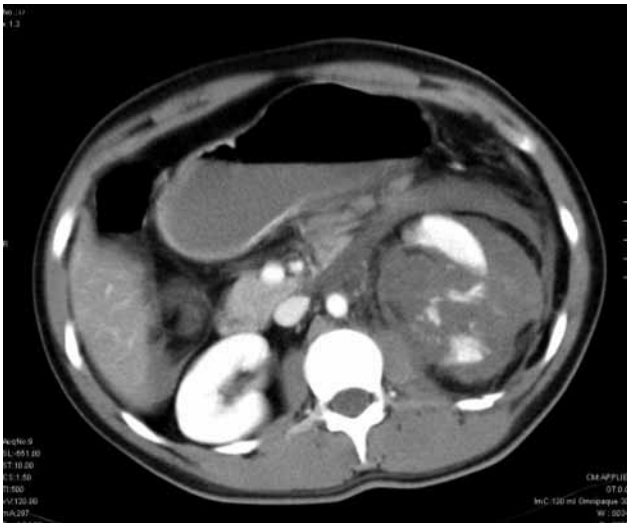


Fig. 1. CT scan with contrast in one of the patients in this study showing grade V renal injury that required nephrectomy.

There were two pedestrians and two motorcyclists and the remainder of the patients were car occupants ($n=14$, 78%; driver: 6; front-seat passenger: 6; back-seat passenger: 2). Similarly, 78% of patients with non-GU injuries were car occupants. The primary crash mechanism was side angle collision in seven patients (39%) compared to 16% in patients with non-GU injuries ($p=0.015$). Other crash mechanisms in GU patients were as follows: front impact in 4 cases (22%), rear end impact in 1 case (6%), rollover collision in 4 cases (22%), and pedestrians in 2 cases (11%).

DISCUSSION

Road traffic collision (RTC) is the most frequent cause of GU injuries in patients with severe trauma.^[1] Nevertheless, the epidemiology of GU organ injury following trauma in general and after RTC in particular is not well studied. One of the few studies that addressed the incidence of GU injuries in trauma was the one performed by Wessells et al.^[8] They reported a 1.2% incidence of renal trauma among 500,000 patients who were hospitalized for trauma in the United States (US). McAleer and colleagues^[9] also reported an incidence of 3% for renal and testicular injuries in more than 14,000 children who presented to the emergency department in the US. The epidemiology of GU injuries after RTC is also poorly studied worldwide. One of the very few studies in this field was the one performed by Paparel and colleagues,^[2] who reported an incidence of 0.46% GU organ injury among more than 43,000 victims of RTC in France. However, the incidence and nature of GU injuries after RTC in other parts of the world such as the Middle East, where driving conditions and driver compliance with the use of safety measures are different from those in the West, are not well studied. Indeed, reviewing the English lit-

erature from 1966 till October 2008 did not reveal any data in this regard (Ovid Midline; key words: genitourinary injuries, renal injuries, Middle East, road traffic accidents, road traffic collision).

From the current study, it is obvious that GU injuries are associated with more severe trauma as indicated by the higher ISS among these patients compared to other patients who did not sustain such injuries. Other parameters of severity such as the total hospital stay and percentage of patients who required ICU admission were also higher in the GU patients. The more severe injury in these patients is probably due to sustaining a more severe trauma as indicated by the significantly higher incidence of side angle collisions in GU patients. Side angle collisions have been shown to result in more severe injuries compared to other types.^[10,11] Collectively, these data indicate a more severe degree and mechanism of trauma in patients with GU injuries. This is probably easily understood due to the well-protected location of GU organs, especially the kidney, adrenal and the ureter. Therefore, a high energy impact is required to injure these retroperitoneal organs. Similarly, the urinary bladder and posterior urethra are well protected in the pelvis rendering damage difficult unless there is a severe trauma that results in pelvic fracture, as was the case in the current study where all bladder and urethral injuries were associated with pelvic fractures.

One of the striking results of the current study is the relatively higher incidence of GU injuries among RTC patients compared to those reported by others. For instance, the incidence is almost four times higher than that reported by Paparel et al.^[2] The reason for this higher incidence is probably difficult to ascertain especially in view of the non-availability of data related to the mean ISS and the mechanism of injury in the Paparel et al. study. However, as already demonstrated in the current study, GU injuries appear to be associated with more severe trauma and, therefore, higher ISS. In this regard, there is evidence from some studies in the West to suggest that the mean ISS among our patients is higher. For example, the mean ISS among 5,608 patients who were involved in RTC in Germany from 1994-1999 was 5.0.^[12] One of the possible reasons for this discrepancy in injury severity is the low compliance of our patients with the use of safety measures such as seatbelts, as only 15% of patients in the current study used this safety measure. Therefore, tougher government legislations (seatbelt use, speed limit, etc.) and road safety education are needed in developed countries to help lower the incidence of major trauma.

One of the limitations of this study is the relatively small number in the registry especially when compared to the one reported by Paparel et al.^[2] This may

also explain the non-existence of injury to the genitals in the current series. However, our study has the advantages of the prospective studies. Furthermore, the data which were collected by the second author were verified by a urologist (first author). This also included reviewing the radiological images.

In conclusion, this is the first report from the Middle East regarding the incidence of GU injuries after RTCs. From the available evidence, it appears that the incidence is higher than that reported from the West. Patients with GU organ injury tend to have more severe trauma compared to other patients. Finally, the kidney is the main GU organ injured in RTCs.

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