

Renal Trauma Management in 8 Cities of Iran

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Abstract: This prospective study, conducted in 8 cities of Iran from 1999 to 2000. Out of total 16,573 trauma patients, 106 (0.63%) included in this study had renal injury. This study aimed at investigation of incidence, etiology and management of renal trauma patients in Iran. They were 87 (82.1%) male and 19 (17.9%) female. Renal trauma mechanism was mainly blunt injury (93.4%). Road traffic crashes (61.3%) and falls (22.7%) were the most leading causes of trauma. Patients had different grades of renal trauma as follow: Sixty-six (62.3%) grade I, 14 (13.2%) grade II, 10 (9.4%) grade III, 8 (7.5%) grade IV and 8 (7.5%) grade V. Out of 106 patients, eighty-three (78.3%) patients managed conservatively, most had grade I injury ($P < 0.0001$). Twenty-three (21.7%) patients underwent an operation including: 5 (4.7%) nephrorrhaphy; 6 (5.7%) partial nephrectomy, and 12 (11.8%) total nephrectomy. The higher the grade of renal trauma, the more invasive intervention was needed, as all patients with grade V underwent total nephrectomy ($P < 0.0001$). Six patients (5.66%) passed away, three due to severe renal injury and hemorrhage, and three because of reasons unrelated to renal trauma. We concluded that most renal traumas are blunt type and low grade injury which can be managed successfully non-operatively. Conservative management is the treatment of choice for those with stable hemodynamic state.

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Key words: Renal trauma, management, operative, conservative

Introduction

Kidney is the most commonly injured organ in genitourinary system (1). Santucci et al. reported the proportion of trauma patients with kidney injuries at 1.4-3.25% and estimated the worldwide number of renal injuries at nearly 245,000 cases each year with 70-80% of them being below 44 years old (2).

The frequency of renal injury depends somewhat on the patient population being considered (3). Renal trauma can be life-threatening but no enough information about diagnosis and proper management exists (4).

The vast majority of renal trauma mechanisms are due to blunt injuries, but there may be some geographical variation. Blunt renal trauma in Europe, Canada and rural Turkey are 97%, 93% and 31%, respectively (4). Salimi et al reported 96% of urogenital injuries to be blunt trauma in Tehran- Iran (5). The kidneys are relatively well protected, lying high in the retroperitoneum with the abdominal viscera anteriorly and the back muscles and spine posteromedially. Most renal traumas are

minor due to the anatomic place of kidney. Studies over the past 5 decades support the conservative management for most of renal traumas. The benefit of this method is a decline in iatrogenic nephrectomy (2, 6, 7). Severity of trauma is related to the mechanisms of injury that may be helpful in the choice of management (7).

In this study we investigated the incidence, mechanism, grading and managements of renal trauma, and assessed the Injury Severity Score (ISS) of these patients in 8 cities of Iran.

Patients and Methods

A total of 16753 trauma patients referred to main hospitals of eight cities (Tehran, Shiraz, Ahwaz, Tabriz, Qom, Babol, Meshad and Kermanshah) from 1999 to 2000. We excluded all patients hospitalized for less than 24 hours. These hospitals, in different geographic locations, have the highest load of trauma referral. Data was collected according to the international classification of diseases, 10th revision (ICD-10). Data of 106 renal inju

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ries were gathered at Sina Trauma and Surgery research center. Hospital related data included vital signs, abbreviated injury scale (AIS -90), mechanism, type and grade of trauma, and other associated intra-abdominal organ injuries. Grading of renal traumas was according to the scoring of American Association for Surgery of Trauma (AAST) on organ injury scaling.

The indications of operation included hemodynamic instability of patients on arrival, persistent renal bleeding, expanding hematoma, massive urinary extravasations and vascular injury investigated by sonography, computed tomography (CT) scan, intravenous pyelography (IVP) and angiography. Statistical analysis was done using SPSS-13 software. P value < 0.05 was considered as the level of significance.

Table 1. Distribution of Demographic Data

Parameter	NOP (%)	OP (%)	P value
Age (Mean ± SD)	23.3±15	23.8±17	NS
Male	66 (75.9)	21 (24.1)	NS
Female	17 (89.5)	20 (10.5)	NS
Traffic accident	52 (80)	13 (20)	NS
Non-traffic accident	31(75.6)	10 (24.4)	NS
Blunt trauma	80 (80.0)	19 (20)	0.03
Penetrating trauma	3 (42.9)	4 (57.1)	
Duration of hospitalization	6.8± 6	10±7.2	0.04
Death	3 (50)	3 (50)	NS
Mild injury (Low ISS)	36 (92.3%)	3 (7.7%)	0.009
Moderate injury	19 (79.2%)	5 (20.8%)	
Severe injury (High ISS)	22 (62.9%)	13 (37.1)	

OP: Operative management NOP: Non-operative management
Mild → ISS (1-7) Moderate → ISS (8-12)
Severe → ISS >12 NS: Non-significant

Results

Out of total 16,753 hospitalized trauma patients, 106 cases (0.63%) had renal trauma. Eighty-seven (82.1%) were male and 19 (17.9%) were female. Patients' mean age was 23.44 ± 15.73 years. The majority of patients were in the 2nd and 3rd decade of life.

Blunt and penetrating renal traumas were 93.4% and 6.6%, respectively. Road Traffic crashes (61.3%) and falls (22.7 %) were the most common causes of trauma. Thirty two patients (30.2%) with renal trauma had other associated intra-abdominal injuries. According to ISS, patients with mild (ISS: 1-7), moderate (ISS: 8-12), and severe injury (ISS>12) were 36.8%, 22.6%, 33%, respectively. Eight patients (7.5%) had no ISS document (Table 1).

Sixty-six (62.3%) out of 106 renal trauma patients were of grade I, 14 (13.2%) grade II, 10 (9.4%) grade III, 8 (7.5%) grade IV and 8(7.5%) grade V.

Eighty-three patients (78.3%) were managed non-surgically with blood transfusion, parenteral fluid, antibiotics, analgesic and bed rest, and two patients with grade IV underwent angiographic embolization (Table 2).

Twenty-three patients (21.7%) were managed surgically:

- Nephrorrhaphy for 6 cases (5.7%) with Grade I, II, or III (2 cases of each);
- Partial nephrectomy for 5 patients (4.7%), One with grade II, 2 with grade III and 2 with grade IV; and total nephrectomy for 12 patients (11.3%), one with grade II (8.3%), 2 with grade III (16.7%), one with grade IV (8.3%), and 8 with grade V (66.7%), were performed (Figure 1).

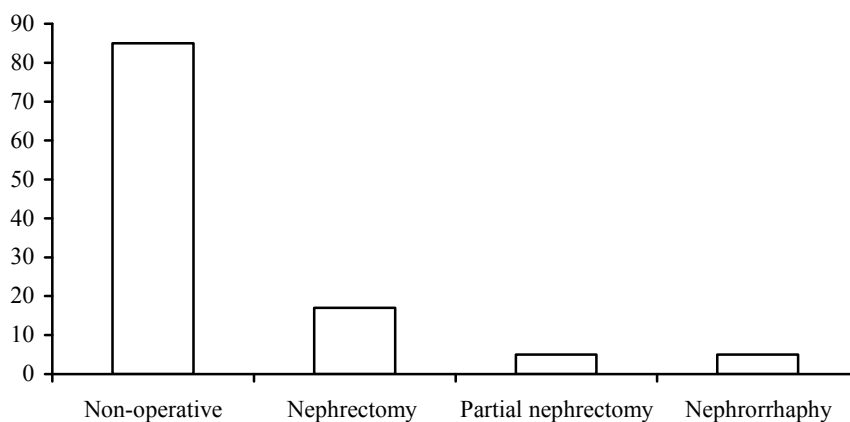


Figure 1. Treatment types of renal trauma

Table 2. Management of Renal Trauma Patients

Grade	Kind of Treatment (Number)		Total
	NOP (%)	OP (%)	
Grade 1	64(97%)	2(3%)	66 (62.3%)
Grade 2	10(71.4%)	4(28.6%)	14 (13.2%)
Grade 3	4(40%)	6(60%)	10 (9.4%)
Grade 4	5(62.5%)	3(37.5%)	8 (7.5%)
Grade 5	0(0%)	8(100%)	8 (7.5%)
Total	83(78.3%)	23(21.7%)	106(100%)

OP: Operative management NOP: Non-operative management

There was no significant difference in management of patients with other intra-abdominal trauma.

As the grade of renal trauma increased, more invasive operations were performed. All patients with grade 5 trauma were managed by total nephrectomy ($P<0.0001$).

Most patients with $ISS>12$ were managed by surgical intervention ($P=0.009$).

Sex, age and the cause of accident had no effect on choice of management.

Diagnostic procedures such as CT, Sonography and IVP were done for most of patients except in multiple injured hemodynamic unstable cases, in whom operation was emergent.

Overall mortality rate was 5.66% (6 cases). Three of these patients underwent total nephrectomy and died due to bleeding and severity of injury. The other 3 cases were treated conservatively, all having concomitant other organ injury (one subdural hemorrhage, one traumatic hemothorax, and one concomitant spleen trauma).

Discussion

An important factor in the management of renal trauma is the severity of injury based on AAST classification which demonstrates that most injuries are of low grades. Most of the low grade renal injuries including grades I, II, and III can be successfully managed conservatively (7). In most cases with grades IV and V and hemodynamic instability, surgical treatment is the best procedure and nephrectomy rate is almost 100% (7-10). The correct rate at which surgery should be applied to renal trauma victims is unknown, but most authors at least agree that grade I renal injury requires no intervention, and grade V injury nearly always requires operative intervention, usually speedy nephrectomy (7). In our

study, all patients with grade V renal injury were managed by total nephrectomy.

Many factors are important in the renal trauma management. One of them is the mechanism of injury. Severity of trauma and other associated organ injuries were less in blunt injury. Thus, nephrectomy rate was lower in this group. Blunt injury was the leading mechanism of renal trauma in 90% of patients in our study which is the same as American and European reports (5, 8, 9).

Different centers involved in this study have varying levels of operative techniques. Varying presentations and management of associated injuries can confound the data, making comparisons between study sites difficult.

Despite Bozeman and coworkers showed that the only statistically significant factor predictor of surgical exploration was a coexisting solid organ intra-abdominal injury, our study showed no significant difference in the choice of management for patients with other intra-abdominal injuries (8).

Numerous centers, including us, have been using hemodynamic instability as the only absolute criteria for immediate operative intervention. The presence of an expanding perirenal mass, pulsating perirenal hematoma, ureteral injury, and renal pelvis injury remain indications for renal exploration (7).

Centers that adopt a conservative approach to the management of renal trauma have decreased their rates of renal exploration; the ultimate goal of this approach is to minimize the incidence of negative laparotomies, unnecessary repairs, and iatrogenic nephrectomy without an increase in morbidity or mortality (7).

Severity of injury, penetrating or blunt trauma and grade of renal injury are important factors in our decision to select the type of management (operative or non operative).

Follow-up of these 100 live patients and assessing their renal function were very important, but we had no definite document in our trauma registry.

In conclusion, most of renal trauma patients have low grade injury that can be successfully treated by non operative methods. Conservative management can be the treatment of choice for renal trauma patients who are hemodynamically stable.

Since renal trauma occurs more frequently in the young population, choice of management that assures kidney rescue is very important.

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