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Is accompanying organ damage related with mortality in renal trauma?

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ABSTRACT

Our aim in this study was to retrospectively review the accompanying organ damage, treatment and follow-up processes of patients in our clinic who had had renal trauma within the last five years.

78 patients who were followed due to renal injury were retrospectively reviewed. The cases were evaluated in terms of age, sex, trauma mechanism, accompanying injuries, injury severity, hematuria, treatment type, blood transfusion, hospitalization duration and results.

Of the 78 patients, renal injury was observed in 33 (42.3%) patients due to a motor vehicle accident and in 16 (20.5%) patients due to falling. Conservative treatment was applied for 77% (n=60) of the patients, while 23% (n=18) of the patients underwent nephrectomy. The most common intra-abdominal injury was observed as a hepatic injury in 18 (23%) patients. In our study, six (7.7%) of the 78 patients had died. Accompanying organ damage was observed in all patients who died, and all of them had high grade renal injury.

Conservative treatment is still important today regardless of the severity of the renal trauma after providing hemodynamic stability. High-grade renal injury and accompanying organ damage are important risk factors in terms of mortality.

Key Words: Kidney, trauma, treatment, mortality

Introduction

Genitourinary system trauma is observed in 10% of all abdominal traumas, the most injured organ of the genitourinary system is kidney (1,2). In males, it is seen three times more than in females (3). Blunt trauma to the kidney is the most common cause of traumatic injury to the kidney with a rate of 90-95% [4]. Blunt trauma usually occurs during a traffic accident or a fall, whereas penetrating injuries occur due to gunshot injuries (GSI) and being stabbed (5). Contrast-enhanced abdominal computed tomography (CT) has become the gold standard in the evaluation of the renal injuries(5). Blunt trauma can affect every organ system and major vascular structure. Management of renal trauma is controversial.

In this retrospective study, we aimed to evaluate the patients with the renal injury who were followed up in our clinic. Also, we evaluate the effect of accompanying organ damage on morbidity and mortality in patients with renal trauma.

Materials and Methods

In this study, 78 patients who were followed in our clinic in last five years due to renal trauma were retrospectively reviewed. The cases were evaluated in terms of age, sex, trauma mechanism, accompanying injuries, injury severity, hematuria, treatment type, blood transfusion, hospitalization duration and results. Renal injury grading was performed according to the classification developed by Organ Injury Scaling Committee of the American Association for the Surgery of Trauma (AAST) as shown in table 1[6]. Contrast-enhanced abdominal CT was used for the diagnosis of all cases and the determination of the injury grade.

Results

The mean age of the patients was 33.1 (± 15.2). The male to female ratio was 3.7/1. The mean hospitalization duration of the 78 patients, who were hospitalized for the renal injury, was 8.9 (± 8.5) days. Of the 78 patients, renal injury was observed in 10 (12.8%) due to GSI, in 16 (20.5%) patients due to falling, in 33 (42.3%) patients due to a motor vehicle accident, in 12 (15.4%) patients due to being stabbed, and in 7 (9%) patients due to other types of injury. Of the 78 patients with a renal injury, 42 (54%) had renal injury on left, 34 (44%) had renal injury on right, and

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Table 1. Organ Injury Scaling Committee of the American Association for the Surgery of Trauma (AAST)

Grade	Type	Definition
1	Contusion	Microscopic or gross hematuria, urological studies normal
	Hematoma	Subcapsular (nonexapnding without parenchymal laceration)
2	Hematoma	Nonexpanding perirenal hematoma confined to renal retroperitoneum
	Laceration	<1cm parenchymal depth of renal cortex without urinary extravasation
3	Laceration	>1cm depth of renal cortex, without collecting system rupture or urinary extravasation
4	Laceration	Parenchymal laceration extending through the renal cortex, medulla and collecting system
	Vascular	Main renal artery or vein injury with contained hemorrhage
5	Laceration	Completely shattered kidney
	Vascular	Avulsion of renal hilum which devascularizes kidney

2 (2%) had renal injury on both sides. Hematuria was observed in 68 (87.1%) of 78 patients with renal injury. Of the 10 patients (12.8%) without hematuria, eight (10.2%) had grade 1 injury, and two (2%) had grade 2 injury. Patients without hematuria were observed to have low grade renal injury. Renal injuries graded with CT, 26 (33%) of 78 cases were found to have grade 1; 12 cases (15%) had grade 2; 12 cases (15%) had grade 3; 8 cases (10%) had grade 4 and 20 cases (25%) had grade 5 renal injury. One of our patients with Grade 4 injury due to sharp object had a solitary kidney. Of the patients with renal injuries, 18 (23%) were operated with nephrectomy. Six of the patients (33%) underwent nephrectomy had grade 4, and 12 (66%) of them had grade 5 injury.

Of the 78 patients with a renal injury, hepatic injury in 18 (23%) patients, spleen injury in 12 (15%) patients, and bowel injury in eight (10.2%) patients were observed as intra-abdominal injury accompanying to the renal injury. Thoracic injury in 34 (43%) patients, spinal cord injury in 20 (25.6%) patients, head injury in 10 (12%) patients, femur injury in eight (10.2%) patients, pelvis injury in four patients (5%), and maxilla injury in two (2%) patients were observed as accompanying extra-abdominal injuries. Eighteen (23%) of the 78 patients with renal injury underwent a nephrectomy surgery. Six (7.7%) of 78 patients included in our study died. The mean age of patients who died was 41.83 (± 19.125) years. Accompanying organ damage was observed in all patients who died. Head trauma and chest trauma were observed in three patients, chest and pelvis injuries were found in three patients, grade 5 and grade 4 renal injuries were observed in four and two patients, respectively. Two patients with pelvic fracture were fixed, while tube thoracostomy was performed in 3 patients with chest injury.

Discussion

Renal trauma may occur due to different mechanisms. The most common cause of blunt abdominal trauma that brings about renal damage is motor vehicle accidents [7,8]. Renal traumas were reported to be mostly seen in men. It was also reported that 72% of these traumas were observed in 16 to 44 years of age, and were mostly seen on the left side [9,10]. Renal injuries are generally classified as blunt renal injuries (80-90%) and penetrating renal injuries (10%)[10,11]. In our study, the mean age of the patients was observed as 33.1 years. Renal injuries were seen on both sides in 2% of the patients, whereas left renal injury and right renal injury were observed in 54% and 44% of the patients, respectively. In our study, the most common cause of renal injury was observed to be motor vehicle accidents with the rate of 46.2%. Of the patients with renal trauma, 62.8% were injured due to blunt trauma. Our results were consistent with the literature.

Most renal traumas are associated with hematuria, and the severity of hematuria may increase in severe traumas (95%). However, no hematuria may be observed in the ureteropelvic junction avulsion and renal pedicle injuries[11]. In the present study, hematuria was observed in 87.1% of the patients. Of the 10 patients (12.8%) without hematuria, eight (10.2%) had grade 1 injury, and two (2%) had grade 2 injury. Patients without hematuria were observed to have low-grade renal injury.

The main objective of the renal trauma treatments is to preserve renal functions and decrease the morbidity and mortality rates [10,12,13]. According to this, conservative treatment has been suggested to be sufficient in the treatment of the most renal injuries due to blunt trauma and some penetrating renal injuries [8,13]. Conservative treatment is recommended for renal injuries due to blunt trauma

since 90% of them are mild injuries (10,12). Some studies showed that conservative treatment reduces the nephrectomy rates thanks to low complication rates (14,15). Embolization is another non-operative treatment method and has been successfully used for renal trauma[12].

Although the treatment is completely conservative in grade 1-2-3 renal traumas, the treatment to be applied to patients with grade 4-5 renal injury has been still discussed. In a study by McAninch et al (6), grade 1-3 renal traumas were reported to be treated with conservative treatment regardless of its cause, and 95% of recovery could be achieved in renal injuries with all grades through conservative treatment. In our study, no surgical procedure was performed for the patients with grade 1-2-3 renal traumas, and all of these patients had a successful recovery through conservative treatment. Conservative treatment is contraindicated in cases where there is a hemodynamic instability due to bleeding and a developing pulsatile retroperitoneal hematoma as well as ongoing hypotension despite the transfusion and suspicion of the renal pelvis and ureteral injury[17,18]. In a study by Santucci et al. (17). 78% of patients with grade 4 trauma were received renal exploration, and renography and nephrectomy were performed for 69% and 9% of them. Lanchon et al. (16) reported the success rate of conservative treatment in patients with grade 4 and 5 renal traumas as 88% and 50%, respectively. In a study by Shoobridge et al. (19), all patients with grade 1-2 injury, 94% of the patients with grade 3 injury, 90% of the patients with grade 4 injury, and 35% of the patients with grade 5 injury were followed conservatively. In a retrospective study by Ekşi et al. conducted with 135 renal trauma cases, 86% of the patients were followed with conservative treatment, and exploration was performed for 18 patients. Of the patients, who received exploration, nine had grade 5 renal injuries and they underwent nephrectomy, whereas renography was performed to nine patients (20).

In our study with 78 patients, nephrectomy was performed for 18 patients (23%), and conservative treatment was applied to other patients (77%). Eighteen (64.2%) of the 28 patients with grade 4-5 renal injuries underwent nephrectomy. One of our patients with grade 4 injury who received conservative treatment, had solitary kidney. Of the patients who underwent nephrectomy, twelve had grade 5 renal injury, and six had grade 4 renal injury. In the literature, exploration rates were observed to be high in patients with grade 4-5 injury, similarly (20,21,21). However, nephrectomy rates were found to be high in our study. This was because none of our patients on whom exploration was performed was suitable for renography. Each of these patients was referred to us from an external center, and their hemodynamics were unstable. Also, we didn't have technical possibilities for embolizitation.

Patients will often have significant concomitant injuries and will require operative intervention for those injuries (eg, pelvic stabilization, splenectomy, abdominal packing) (21). It was reported that the most common intra-abdominal organ injury that was accompanied by the renal injury was found as hepatic injury (22). Similarly, in our study, the hepatic injury was observed to be the most common accompanying intra-abdominal organ injury in 23% of patients. In addition, spleen injury was observed in 15% of the patients, and bowel injury was observed in 10% patients. Six (7.7%) of 78 patients included in our study died. We observed that all patients who died had intraabdominal injury accompanying to renal injury. Hepatic injury, bowel and spleen injury was observed in 3, 1 and 2 patients who died, respectively. Gedik et al. reported overall mortality of renal trauma rate was 16.8%. Intraabdominal injuries in 63.6% patients were seen in their study. Also, they found extra-abdominal organ injuries with a rate of 36%. The most frequent extra-abdominal organ injury was extremity fractures (22). Their mortality rate was higher than our result. It can be attributed to the presence of penetrating trauma patients in 60.1% of the patients. Regarding accompanying extra-abdominal injuries, thoracic injury in 43% of the patients, spinal cord injury in 25.6% of the patients, head injury in 12% of the patients, femur injury in 10% patients, and pelvis injury in 5% of the patients was observed in our study. Five of these patients who died needed another interventions. Two of them with pelvic fracture were fixed, while tube thoracostomy was performed in 3 patients with chest injury.

The grade directly correlates with the need for intervention, nephrectomy and mortality (21). Although high-grade injuries of the patients who underwent nephrectomy is in accordance with the literature, high nephrectomy rates in our study may be due to the more complicated patients are referred to our hospital, as we are the only advanced central hospital in the region. Grade 5 and grade 4 renal injuries were observed in four and two patients who died, respectively. Accompanying organ damage was observed in all patients who died, also they had high grade renal injuries.

Conservative treatment is still being performed in cases where hemodynamic stability is achieved regardless of the radiological staging of the renal trauma. High-grade renal injuries and accompanying organ pathologies are important risk factors in terms of mortality.

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