

The Non-Operative Management of High-Grade Blunt Renal Trauma in Misurata Medical Center, Libya

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Abstract

Background: In trauma cases, genitourinary tract injuries occur in approximately 10% of cases, with renal trauma being the most common. Management of blunt renal trauma has evolved from operative to non-operative approaches over the last 30 years. **Materials and Methods:** This retrospective study evaluated the efficacy of non-operative management (NOM) for high-grade blunt renal trauma at Misurata Medical Center, Libya, from January 2016 to January 2018. Sixty-seven male patients (ages 25-67) were included. **Results:** The primary mechanisms of injury were road traffic accidents (52%), falls (28%), and fighting (20%), with most non-MVA injuries occurring during the 2016 war. The right kidney was more frequently affected (61%). The majority of injuries were Grade III and IV lacerations. Eighty-seven percent of patients presented with associated abdominal organ injuries. Two patients with Grade V injuries, who were hemodynamically unstable with active bleeding and associated liver trauma, underwent immediate nephrectomy. Crucially, the study found that renal injury grade was not a statistically significant predictor for operative management in hemodynamically stable patients. Short-term complications included urinary tract infections, hematuria, and abscesses. Mortality was not significant for stable patients. **Conclusion:** This study supports the increasing trend towards conservative management, demonstrating that NOM is largely successful for high-grade blunt renal trauma in hemodynamically stable patients, with a low failure rate and excellent renal salvage.

Keywords: Renal injury, blunt trauma, conservative treatment, nephrectomy.

Introduction:

Injury to the genitourinary tract, although only occurring in approximately 10% of trauma cases, is an important topic as any genitourinary organ can be subjected to trauma [1]. This review will focus only on renal trauma, which is the most common organ involved. The severity of renal trauma can range significantly; thus, the management options likewise can vary. Renal injury occurs in approximately 1% to 5% of all traumas and can be classified as blunt or penetrating according to the mechanism [2]. Blunt injuries are usually secondary to high-energy collisions such as motor vehicle accidents (MVA), falls from a height, and contact sports. The majority of blunt renal trauma cases are associated with injury to other abdominal organs, but they are commonly low-grade injuries [3]. In the last 30 years, the treatment strategy of renal trauma has changed from operative management (OM) to non-operative management (NOM) [4]. Several studies showed improving

outcomes when NOM was applied in blunt trauma, and, therefore, conservative management gained increasing popularity among trauma surgeons [5,6]. With current management, the majority of hemodynamically stable patients with renal injuries are successfully managed nonoperatively [7-8]. In the last decades, improved radiographic techniques and the development of a validated renal injury scoring system have led to improved staging of injury severity that is relatively easy to monitor and has change surgeon's planning away from surgical intervention and towards more conservative approaches. In addition, improved hemodynamic management of patients in specialized units has led to improved outcomes with non-operative management. Furthermore, selective treatment with interventional procedures in radiology has reduced the need for surgical intervention. Successful homeostasis with angiography and renal embolization has been achieved for patients with blunt and penetrating renal injuries [9,10,11].

Table 1. Grades of renal injuries according to the American Association for Surgery of Trauma Renal Injury Scale

GRADE	TYPE OF INJURY	Description of injury
I	Contusion	Microscopic or gross hematuria, urologic studies normal
	Hematoma	Subcapsular, nonexpanding without parenchymal laceration
II	Hematoma	Nonexpanding perirenal hematoma confirmed to renal retroperitoneal
	Laceration	<1.0 cm parenchymal depth of renal cortex without urinary extravasation

III	Laceration	>1.0 cm parenchymal depth of renal cortex without collecting system rupture or urinary extravasation
IV	Laceration	Parenchymal laceration extending through renal cortex, medulla, and collecting system.
	Vascular	Main renal artery or vein injury with contained hemorrhage
V	Laceration	Completely shattered kidney
	Vascular	Avulsion of renal hilum which devascularizes kidney

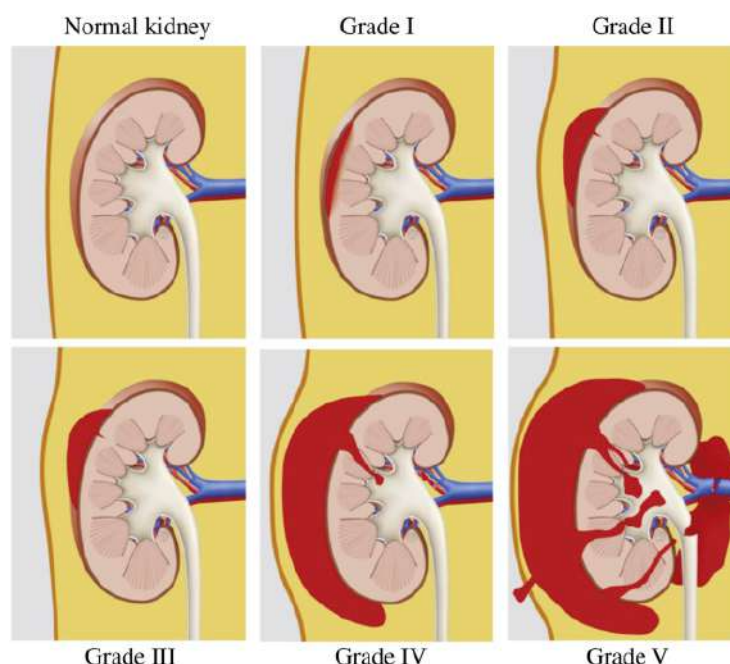


Figure 1: Grades of renal injuries according to the American Association for Surgery of Trauma Renal Injury Scale

Materials & Methods:

Our study was designed to evaluate patients retrospectively at the period between January 2016 to January 2018 of all patients admitted in the urology department of Misurata Medical Center, of all age groups and both sexes. Data were collected from the records of Misurata Medical Center. Data about demographic characteristics, mechanism of trauma (road traffic accident (RTA), fall down, fighting...etc), severity of trauma (radiological grade), hemodynamic stability, type of management, and clinical outcome were collected.

Result:

We identified 67 high-grade blunt renal injuries from January 2016 to January 2018. Of these patients: 35 (52%) due to RTA (10 of them due to MVA 19 (28%) due to F 13 (20%) due to FIGHTING

(Note: most of the injuries, apart from the MVA, happened in the war in 2016)

All patients were males. The age range was between 25-67 years; 58 (87%) of them had other abdominal organ injuries, and just 9 (13%) had isolated kidney injury, all of them due to fighting.

Right kidney mostly affected 41 (61%) and left side is 26 (39%) and grades was variant in the same injury but in most cases was one to two lacerated wounds of grades III & IV, and all of them was vitally stable and on CT scan there is no active bleeding or expanding hematoma apart of two patients were presented with grade V renal injury with complete renal pedicle shuttering and they were unstable hemodynamically and associated with liver injury where immediately taken to operation theater and nephrectomy performed, we found that injury grade was not a statistically significant risk factor for operative management if patient vitally stable, Due to the difficult situation that time due to war and nature of some trauma patients long-term follow-up was

not possible, short-term complications included five patients with UTI, hematuria, and two right flank abscess, and three patients requiring need for stent placement.

Mortality was not significant for those vitally stable but was higher with older age (>50) and severity of injuries of other organs, but not with grades of renal injury, apart from two operated patient, all of whom retained their renal function.

Table 2. Age groups of patients

Age Group	Number of Patients	%
25-37	29	43
38-50	23	34
51-67	15	22

Table 3. Distribution of Type of Trauma

Type of Trauma	Number of Patients
RTA	35
FD	19
Fighting	13

Table 4. Distribution of Hemodynamic Stability

Stability	Number of Patients	%
Stable	65	97
Unstable	2	3

Table 5. Distribution of Renal Injury Grade

Grade	Number of Patients	%
III	13	19
IV	49	73
V	5	7

Table 6. Abdominal Organ Injury among patient

Organ Injured	Number of Patients	%
Liver	24	41
Spleen	18	31
Other	16	28

Table 7. Extravasation post-trauma among patient

Extravasation Type	Number of Patients	%
None	18	27
Urinary	47	70
Active Bleeding	2	3

Table 8. Free Abdominal Blood on CT

Blood Presence	Number of Patients	%
none	13	19
confined to site of trauma	28	42
diffuse	26	39

Table 9. Distribution of Morbidity among patients

Morbidity Type	Number of Patients	%
None	17	25
Kidney Related	5	7
Non-Kidney Related	45	67

9. Complications (Outcome) among patients

Complication	Number of Patients	%
UTI	5	7.5
Haematuria	5	7.5
Ascuss	2	3
Stenting	3	4
Total	15	22

Table 10. Relationship between operative management and non-operative management within clinical features

	OPERATIVE MANAGEMENT(2)	NON OPERATIVE MANAGEMENT(65)	P-value
CAUSE OF TRAUMA:			0.699
RTA(35)	2 (5.7%)	33 (94.3%)	
FALLDOWN(19)	0 (0%)	19 (100%)	
FIGHTING(13)	0 (0%)	13 (100%)	
STABILITY:			0.000
STABLE(65)	0 (0%)	65(100%)	
UNSTABLE(2)	2 (100%)	0 (0%)	
GRADE ON CT:			0.005
III (13)	0 (0%)	13 (100%)	
IV (49)	0 (0%)	49 (100%)	
V(5)	2 (40%)	3 (60%)	
ABDOMINAL ORGAN INJURY			0.674
LIVER INJURY (24)	1 (4.2%)	23 (95.8%)	
SPLEEN INJURY (18)	1 (5.6%)	17 (94.4%)	
OTHER ABDOMINAL ORGAN INJ(16)	2 (12.5%)	14 (87.5%)	
EXTRAVASATION:			0.001
ACTIVE BLEEDING(2)	2 (100%)	0 (0%)	
URINARY(47)	1 (2.1%)	46 (97.9%)	
NONE(18)	0 (0%)	18 (100%)	

FREE BLOOD ON ABDOMINAL CT:			0.182
DIFFUSE(26)	2 (7.7%)	24 (92.3%)	
CONFINED TO SITE OF TRAUMA(28)	0 (0%)	28 (100%)	
NONE(13)	0 (0%)	13 (100%)	
MORBIDITY:			0.225
NONE(17)	0 (0%)	17 (100%)	
KIDNEY RELATED(5)	1 (20%)	4 (80%)	
NON KIDNEY RELATED(45)	2 (4.4%)	43 (95.6%)	

Discussion:

In our study, the surgeon must use multiple clinical and radiological factors to determine the proper course of treatment, and renal trauma is rarely an isolated event and often occurs in the presence of multiple other injuries, so decision-making in high-grade blunt renal injuries is difficult [3]. There are multiple recent studies discussing the indications for operation in high-grade injuries. **Hardee et al.** retrospectively reviewed charts patients 115 of with grade 3 or 4 blunt renal injury. The intervention rate was 7% with nephrectomy being the most common procedure. Active vascular extravasation and perinephric hematoma > 3.5 cm were predictive of operative treatment [12].

Aragona et al. retrospectively reviewed 45 patients with high-grade blunt renal trauma, 6 of whom had grade V injuries. The study concluded that conservative management yielded favorable results; however, over 80% of grade V injuries required operation [13]. Other studies support the success of conservative management for grade V injuries in hemodynamically stable patients. A multicenter study of the research **consortium of New England Centers for Trauma** retrospectively reviewed charts of a total of 206 adult patients with a grade IV or

V blunt renal injury (BRI). They found that **hemodynamically** stable patients with a grade IV or V BRI were safely managed nonoperatively. Nonoperative management failed for only 6.5% of patients owing to renal-related injuries, and three-fourths of the entire population retained their kidneys. [14]. Our findings validate the findings of many recent studies suggesting that a trend towards conservative management in high-grade blunt renal trauma is defensible as all factors studied, only hemodynamic stability at admission and concomitant abdominal organ injury, were predictive of the need for immediate operative intervention.

Conclusion:

Nonoperative management of high-grade blunt renal trauma is successful in most hemodynamically stable patients. In our study, the rate of failure in NOM patients is very low.

Conflict of Interest

There are no financial, personal, or professional conflicts of interest to declare.

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