

ORIGINAL RESEARCH ARTICLE

OUTCOME OF RENAL TRAUMA IN A TERTIARY CARE CENTER OF NEPAL: A RETROSPECTIVE STUDY

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ABSTRACT

Background: Management of renal trauma has evolved over past decades from surgical exploration to renal preservation. Conservative management of high-grade renal trauma is possible due to advancement in imaging modality, dedicated critical care and availability of selective embolization. The objective to this research was to analyze the demographics, characteristics and management of renal trauma in our institution.

Methods: All patient who were admitted to College of Medical Sciences Teaching Hospital with diagnosis of renal trauma from 2017 to 2022 were retrospectively analyzed. Ethical approval was taken from institutional review committee of college of Medical Sciences. Data was collected from hospital medical records. Data was analyzed using descriptive statistical tools. For the categorical variable frequency and percentage was calculated while for continuous variables mean and standard deviation was calculated.

Results: Sixty-three patients were included in this study and Median age of patient admitted with renal trauma was 31 years with male to female ratio of 7:3. Blunt renal trauma was the most common type (96.8 %) with Road traffic accidents responsible for the majority of mechanisms of injury 66.7% (42) followed by fall 11(17.5%). Majority of Renal trauma was in AAST Grade III 26(41.3%). Right sided renal injury was common 33 (52.4%) than left sided renal injury 30 (47.6%). Intervention was required in 9 patients.

Conclusions: High-grade renal trauma can be managed conservatively in selected cases with close monitoring in critical care unit and with use of minimally invasive technique such as Selective angioembolization, Double J Ureteric stenting or Nephrostomy Insertion. But hemodynamically unstable patient after resuscitation warrants immediate surgical exploration.



INTRODUCTION

The kidney is the most commonly injured genitourinary organ in trauma even being well protected by the strong lumbar muscles, vertebra, ribs, and abdominal viscera on the anterior side.¹⁻³ The severity of renal trauma can range significantly, and thus the management options likewise can vary. The most common grading for renal trauma is that of the American Association for the Surgery of Trauma (AAST). This classification is a predictor for morbidity in blunt and penetrating renal injury and for mortality in blunt injury.⁵ Globally, renal trauma is present in approximately 0.5–5% of patients with traumatic injury and 10–20% of patients with abdominal trauma.⁴⁻⁶ Several studies showed improving outcomes when Non operative management was applied in blunt trauma and, therefore, conservative management gained an increasing popularity among trauma surgeons.⁷⁻⁹ Over the last decades, the paradigm for treatment has shifted away from surgical intervention towards more conservative approaches, due to the staging system and the development of interventional radiological procedures.¹⁰ Nevertheless, no consensus exists regarding indications and techniques for renal exploration.

The goals of treatment include accurate staging, maximal preservation of renal function, and minimal complications.¹¹

The purpose of this study is to retrospectively analyze the demographics and characteristics of renal trauma in our institution.

METHODS

All patient who were admitted to College of Medical Sciences Teaching Hospital with diagnosis of renal trauma from January 2017 to April 2022 were retrospectively analyzed after obtaining approval from Institutional Review Committee of College of Medical Sciences ((Ref COMSTH-IRC/2022-019). Data was collected from hospital records for the cases of renal trauma and further inquiry was made from phone call. Based on the available data we analyzed on patient characteristics including age and gender, type and mechanism of injury, Grades of renal injury, associated injuries, management, total blood transfusions required, length of hospital stay (LOS) and outcome. American Association of Surgery for Trauma (AAST) Grading was done based on the available CT report

and the grades are grade I: Contusion (hematuria with normal imaging) or subcapsular hematoma without parenchymal laceration, Grade II: Non-expanding perirenal hematoma confined to Gerota's fascia or laceration of the parenchyma <1 cm without urinary extravasation, Grade III: Laceration of the parenchyma >1 cm without collecting system rupture or urinary extravasation, Grade IV: Parenchymal: laceration extending through the renal cortex, medulla and collecting system Vascular: Main artery or vein injury with contained hemorrhage and Grade V: Parenchymal: Completely shattered kidney, Vascular: Avulsion of renal hilum which devascularizes the kidney. All collected data was tabulated using Microsoft Excel (Microsoft Office 2019) to facilitate interpretation. Results were imported to IBM SPSS 20. Data was analyzed using descriptive statistical tools. For the categorical variable frequency and percentage was calculated while for continuous variables mean and standard deviation was calculated.

RESULTS

Sixty-three patients were included in this study and 3 patients were excluded from study because of incomplete information available on medical record file. Patient demographics and characteristics were also included. Median age of patient admitted with renal trauma was 31 years with male to female ratio of 7:3. Majority of the injury taken place due to road traffic accident and the injuries were in side of kidney. The average length of hospital stay was 8.11 days, ranging from 5 to 14 days. Blunt renal trauma was the most common type (96.8%) with Road traffic accidents responsible for the majority of mechanisms of injury 42 (66.7%) followed by fall 11(17.5%). Right sided renal injury was common 33 (52.4%) than left sided renal injury 30 (47.6%). Hematuria (both microscopic and gross) was found in 69.9% of all renal trauma most patients with renal trauma (74.6%) had other concomitant organ injuries. Only 16 (25.4%) patients had isolated renal trauma. Liver (20.6%) and Spleen (13%) injuries were most associated with renal trauma. Intervention was required in 9 patients. Five of the 63 (7.9%) patients had Nephrectomy, among them 4 patients underwent nephrectomy because of hemodynamic instability and one pediatric patient underwent nephrectomy owing to low blood volume in children because of serial drop in hemoglobin and hematocrit. Two patients underwent primary repair of renal injury (renorrhaphy) and DJ stenting and angioembolization in each single patient.

There was no mortality during hospital Stay (Table 1).

Table 1: Clinico sociodemographic characteristics of the patients (n=63)

Variables	Frequency (%)
Median age of patient	31(4-76)
Male to female ratio	7:3
Mode of Injury	
Road Traffic Accident	42(66.7%)
Fall	11(17.5%)

Stab Injury	2(3.2%)
Assault	4(6.3%)
Others	4(6.3%)
Side of injured kidney	
Right	33(52.4%)
Left	30 (47.6%)
Number of patients who was managed conservatively	54 (85%)
Number of patients who required intervention	9 (14.2%)
Average length of hospital stay (days)	8.11 (5-14)
Characteristics of Organ Injury in Renal Trauma	
Isolated Renal Injury	16 (25.4%)
Renal Trauma with Associated Organs Injury	47 (74.6%)
Hematuria at Presentation	
No Hematuria	12 (30.2%)
Microscopic Hematuria	25(39.7%)
Gross Hematuria	19 (30.2%)
Type of Trauma	
Blunt Trauma	61(96.8%)
Penetrating Trauma	2 (3.2%)
Management	
Conservative Management	54(85.7%)
Nephrectomy	5 (7.9%)
Renal Repair	2(3.2%)
DJ Stenting	1(1.6%)
Angio-Embolization	1(1.6%)
Associated Injury	
Isolated Renal Injury	16 (25.4)
Liver	13(20.60)
Spleen	10 (15.90)
Mesenteric Tear	1 (1.60)
Rib Fracture	8(12.70)
Pneumo and Haemothorax	7(11.1)
Limb Fracture	4(6.30)
Head Injury	3(4.80)
UB Injury	1(1.60)

Majority of Renal trauma was in AAST Grade III 26(41.3%) followed by Grade IV 22 (34.9%) and least common being Grade I 1(1.6%) in our study. Majority of injury was Low Grade (AAST Grade I-III) 58.7% and Most of the patient was managed conservatively (54 out of 63). Thirty one percent of high-grade renal injury required intervention whereas 69% of high-grade renal injury is managed conservatively (Table 2).

DISCUSSION

Renal trauma can be both blunt and penetrating but majority are blunt. Management of renal trauma has evolved over decades from conventional nephrectomy to renal preservation. These days most of the renal trauma are managed non-operatively. NOM of renal trauma is getting popular among urologist but it is only possible in hemodynamically stable patient even after resuscitation. Resuscitation is usually not required for low grade renal injury whereas it is often required in high grade renal trauma. During the of management of high-grade renal

Table 2: AAST grading with number of renal injury and conservative management, intervention required according to high, low grade renal injury

AAST Grading	Frequency (%)
Grade 1	1(1.59)
Grade 2	10(15.87)
Grade 3	26(41.27)
Grade 4	22(34.92)
Grade 5	4(6.35)
Low or Grade injury	
Low Grade Renal Injury (AAST Grades I-III)	
Conservative management	36((57.1)
Intervention required	1(1.59)
High Grade Renal Injury (AAST Grades V-VI)	
Conservative management	18(28.57)
Intervention required	8(12.70)

trauma some may require selective arterial angioembolization, Ureteric stenting or nephrostomy tube insertion for pelvico-ureteric disruption and large urinoma. In our study, out of 63 patients with renal trauma average age of patient with renal trauma was 33 years and the ratio of male to female was 7:1 which was similar to previous study.¹²⁻¹⁵ Blunt renal trauma and penetrating renal trauma accounted 96.8% and 3.2% respectively in our study. Elaine J et al¹⁶ reported blunt renal trauma in 82.5% whereas penetrating renal trauma in 8.5% in pediatric population. Similarly, Sophia Liff Maibom et. al¹⁷ reported Blunt renal injuries in 93% and penetrating injuries in 7%. RTA was commonest mode of Injury and second most common being fall injury in our study which is consistent with the study done by Shoobridge et. al¹⁸ but contrary to study done by Poudyal S et. al¹⁹ where he showed that fall injury was commonest mode of injury. In our study RTA was commonest Mode of injury which may be because of young adults who tends to be more aggressive with emotions and they often do not pay attention to safety factors, especially in driving. This may have indirectly affected the increase number of road traffic accident among our study populations. In our study right sided renal trauma was more common than left side (52.5% vs 47.6%) Contrary to study done by Salem et.al²⁰ in South Africa and Sahin et. al²¹ in Turkey where Left sided renal injury was

more common than right sided renal injury. Although the exact reason of the laterality of injury is not known it may be due to the ride sided driving pattern of our country. In Renal with Associated injury, Liver injury was common accounting for 20.6 % cases followed by splenic injury which accounted 13 % of the cases of associated injury. Van der Wilden et al studied 206 patients with grades 4 and 5 renal injuries across New England and managed approximately 75% of those patients with conservative management. Nonoperative management only failed in 6.5% of those patients due to their renal injury.²² In our study conservative management was successful in 85.71% and intervention was required in 14.29% regardless of grades of injuries. Intervention was required in 30.7% of the patient with high grade renal injury and majority were managed conservatively. There is a limitation of this study because it is a retrospective single center study where data were collected from medical records and long-term follow up and outcome of renal trauma patient managed conservatively or operatively couldn't be studied. There was a COVID pandemic with multiple lockdowns during this study period which may have resulted in less number renal trauma patient.

This is a hospital-based study and the results may not be generalized to population.

CONCLUSION

Majority of hemodynamically stable Blunt and penetrating renal trauma is managed conservatively with good outcomes. Even high-grade renal trauma can be managed conservatively in selected cases with close monitoring in critical care unit and with use of minimally invasive technique such as Selective angioembolization, Double J Ureteric stenting or Nephrostomy Insertion. But hemodynamically unstable patient after resuscitation warrants immediate surgical exploration.

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