

Conservative management a safer option in high-grade renal injuries: Our institutional experience



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ABSTRACT

Background: Renal injuries constitute around 1–5% of all trauma associated injuries. In present era, there has been a focus toward conservative management for blunt renal injuries. Advancement in radiographic injury grading, improved hemodynamic monitoring systems, valid renal injury grading systems allows successful non-operative management for renal preservation even in cases of Grades IV and V. **Aims and Objectives:** The aim of our study was to assess outcomes of patients managed conservatively (non-operatively) for high-grade blunt renal injury at our center. The objective of this study is to assess whether high-grade renal injuries can be managed by conservative management successfully or not. **Materials and Methods:** The study conducted in a retrospective manner using hospital records of the past 2 years. Thirty patients with blunt renal injuries were included in the study and were categorized based on the American association for the surgery of trauma (2018 revised) injury grading. These management strategies were analyzed in terms of “failure of conservative management,” complications, and need for adjuvant procedures. Statistical data analysis was done using Microsoft Excel (2019) software. **Results:** Thirty patients were included in the study with a mean age of years. Out of the total 30 patients, 17 had Grade I–III injuries, and 13 had Grade IV. All the Grade I–III patients were managed conservatively and required no adjunctive procedures. 10 out of 13 cases of Grade IV injuries underwent non-operative management. Complications included urinary tract infection (5), persistent hematuria (3), hypertension (1), urinoma (2), and ileus (1). All complications were of Clavien Dindo classification of grade 1–2. **Conclusion:** Grade IV blunt renal injuries can be managed conservatively if the patient is hemodynamically stable.

Key words: Renal injury; Exploration; Conservative; Non-operative; Nephrectomy

INTRODUCTION

In trauma cases, renal injuries account for up to 1–5% and are one among the most commonly injured organ following abdominal trauma.^{1–3} The management of renal injuries has evolved over the past few decades with a shift toward non-operative management.

Grading of renal injury refers to the use of imaging studies to assess the extent of renal injury. Various methods have been proposed for staging and management of renal

trauma according to the severity of the renal injury. The widespread availability and anatomic details provided by computed tomography (CT) imaging has now replaced the less specific intravenous pyelography for grading purposes.⁴

Advancement in radiographic injury grading, improved hemodynamic monitoring systems, valid renal injury grading systems allows successful non-operative management for renal preservation even in cases of Grades IV and V.⁵

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Aims and objectives

The objective of this study is to assess whether high-grade renal injuries can be managed by conservative management successfully or not.

MATERIALS AND METHODS

Our study was carried out at G. M. K. M. C. H Salem, Tamil Nadu, India in a retrospective manner. The study data were collected from medical record department dated from year 2021–2022.

Inclusion criteria

All patients with renal trauma who presented to our center during the period between and were included in the study.

Exclusion criteria

Patients with penetrating renal injuries were excluded from the study.

All patients with blunt renal injury, diagnosed surgically, and radiologically were graded using American association for the surgery of trauma (AAST) grading.^{6,7} The patients were divided into two groups; operative management and conservative/non-operative.

A patient added into operative group if exploration was done within 24 h of admission and in non-operative group, if no exploration done within 24 h. Operative management includes surgical intervention such as partial nephrectomy, renorrhaphy, or nephrectomy.

Non-operative cases included are those who are managed with strict bed rest, resuscitation with fluid, and blood transfusions, Double-J stenting, percutaneous drains/nephrostomies, serial Hb% monitoring, hematocrit, complete urine examination (CUE), prophylactic intravenous antibiotic coverage, and intensive monitoring of clinical parameters and vitals.

Indications for operative management were hemodynamic instability at the time of presentation or deterioration during the conservative management time period. Patients who were hemodynamically unstable at presentation with no response to fluid resuscitation underwent emergency exploratory laparotomy. If the patient had deterioration of clinical parameters during the course of conservative/non-operative management and also subsequently had to undergo exploratory laparotomy, then it was considered as a failure of conservative management.

Outcomes of each management strategy were evaluated in terms of complications and need for any interventions.

During follow-up of cases, clinical history, blood pressure monitoring, local examination, CUE, hematocrit, serum creatinine, and imaging (ultrasonography [USG]/CT) if done were noted. The study data were analyzed using Microsoft Excel 2019 software.

RESULTS

Thirty patients were included in the study, out of which were 27 males and three females with ages ranging from 15 to 65 year (38.3 year mean age). Mechanism of blunt trauma causing renal injury were motor vehicle accidents, fall from height, and assault in patients.

Mechanism of blunt trauma causing renal injury was motor vehicle crash in 27 (90%) patients, 3 fall from height in (10%) patients. Three patients presented (10%) with gross hematuria and shock (SBP <90 mm at presentation), 3 (10%) with gross hematuria alone, 6 (20%) patients with microscopic hematuria, and the rest 18 (60%) had neither hematuria nor shock.

The grades of injury and the line of management followed were analyzed in all patients according to AAST Organ injury Severity Scale for the Kidney mentioned, as shown in Table 1.⁵

Table 2 showing number of patients belonging to various grades of renal trauma, line of management with their outcomes. Grade I–III injuries were noted in a total of 17 cases and were managed conservatively with repeat USG at 72 h, monitoring serial hematocrit, and serum creatinine. These patients were discharged after hematuria subsided and/or improved clinically (1–2 weeks).

Thirteen patients were found to have Grade IV renal injuries, out of which two cases underwent immediate exploration and one case went for delayed nephrectomy in view of hemodynamic instability. The rest were given trial of conservative management.

Most common complication seen were urinary tract infection in patients, persistent hematuria seen in three cases, persistent urinoma two cases, and prolonged ileus in one case. All complications were graded according to Clavien Dindo classification grade 1–2 and were managed with intravenous antibiotics and close observation and did not require any other adjunctive interventions.

Success rate of conservative management in the study was in Grade I–III, in Grade IV. All patients were followed up.

Table 1: AAST organ injury severity scale for the kidney⁵

Grade	Type	AAST 2018 revised
I	Contusion Hematoma	Subcapsular hematoma and/or parenchymal contusion without laceration
II	Hematoma Laceration	Perirenal hematoma confined to Gerota fascia Renal parenchymal laceration ≤1 cm depth without urinary extravasation
III	Laceration	Renal parenchymal laceration >1 cm depth without collecting system rupture or urinary extravasation. Any injury in the presence of a kidney vascular injury or active bleeding contained within Gerota fascia
IV	Laceration Vascular	Parenchymal laceration extending into urinary collecting system with urinary extravasation Renal pelvis laceration and/or complete ureteropelvic disruption Segmental renal vein or artery injury Active bleeding beyond Gerota fascia into the retroperitoneum or peritoneum Segmental or complete kidney infarction (s) due to vessel thrombosis without active bleeding
V	Laceration Vascular	Main renal artery or vein laceration or avulsion of hilum devascularized kidney with active bleeding Shattered kidney with loss of identifiable parenchymal renal anatomy

AAST: American association for the surgery of trauma

Table 2: Number of patients belonging to various grades of renal trauma and line of management with their outcomes

Grade of renal injury	Number of patients	Initial non-operative management	Initial operative management	Failure of non-operative management	Overall operative management
Grade I	1	1	0	0	0
Grade II	3	3	0	0	0
Grade III	13	13	0	0	0
Grade IV	13	10	2	1	3
Grade V	0	0	0	0	0
Total	30	27	2	1	3

DISCUSSION

Treatment guidelines for blunt renal injuries have changed over the past few decades and non-operative management has become the newer approach even in managing high-grade renal injuries.

Meta-analysis by Mingoli *et al.*, of 13,000 renal injury cases found that conservative management was the most commonly used in 82% of for renal injury patients versus 17% who underwent operative procedures.¹ A study by Buckley and McAninch, showed successful conservative management in Grade IV renal injuries. Altman *et al.*, study suggested that the higher rates of renal salvage in Grade V injuries were in the patients who are hemodynamically stable.⁸

In high-grade renal injury, conservative management was successful in patients and patients required operative management. Immediate laparotomy was done in two cases of Grade IV injury both underwent nephrectomy. Delayed exploration nephrectomy with open vesical clot evacuation was done in one case, which was a Grade IV renal injuries with persistent bladder clot and was hemodynamically unstable. Nephrectomy in the two patients undergoing immediate laparotomy was for damage control procedure and not for renal salvage surgery.

Many a times surgeons taking the case for emergency exploration are seldom trained in doing renal salvage procedures.⁹ Our study demonstrates that conservative management is associated with low morbidity and complication rates.

In our study, patients underwent immediate surgery due to hemodynamic instability and patients underwent delayed surgery due to deteriorating clinical parameters during the conservative management, which can be comparable to study of Toutouzas *et al.*¹⁰ The renal salvage rate was 90% for the total study group patients, which can be compared to 90.3% in Van Der Wilden *et al.*, study.¹¹

Patients who were managed conservatively should be followed up carefully for any complications at least for 3 months.¹² Follow-up CT scans in patients being managed conservatively are not recommended unless there is clinical deterioration or suspicion of delayed complications such as urinomas or vascular complications (arteriovenous fistulas/pseudo aneurysms).¹² We experienced one mortality in our study that might be due to the fact that the case was immunocompromised with delayed referral to our tertiary center.

Limitations of the study

Drawbacks of our study was it was a retrospective but the ideal study in most cases should always be a prospective

randomized study, which is not feasible or ethical in acute life-threatening situations. The next suitable option, Retrospective Systematic reviews are currently the gold standard for assessing feasibility of conservative management of renal trauma.¹²

As most studies till now have used the AAST grading system and the use of the newer grading system have to be analyzed.¹³

CONCLUSION

Emergency laparotomy is the first line of management in all trauma cases who are hemodynamically unstable. In patients who are stable, contrast-enhanced CT imaging is the gold standard investigation for diagnosis and grading of the renal injuries.

Further, management depends on the clinical status which starts with a “wait and watch” strategy. If the patient is hemodynamically stable, even Grade IV renal injuries can be managed conservatively.

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Authors' Contributions:

PP- Interpreted the results; Reviewed the literature and manuscript preparation. **SP-** Concept, Coordination, Interpretation and publication work. **RR-** Concept and design of the study, Prepared first draft of manuscript. **VS-** Data Collection, Statistical Analysis, Preparation of Manuscript.

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