DIFFERENCE IN THE OUTCOME OF PATIENTS MANAGED WITH ISOLATED RENAL INJURY AND CO-EXISTENT ABDOMINAL ORGAN INJURY

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Objective: Involvement of associated intra-abdominal organs like spleen; pancreas, bowel and liver with renal injuries have a higher rate of open operative management. This is often done to avert the potential of peri-renal infection and subsequent risk of secondary hemorrhage of the injured kidney after intra-abdominal surgery. With this background we reviewed our experience to see if operative intervention for co-existing injuries to intra-abdominal organs increase the rate of nephrectomy for grade II-IV renal injuries. **Methods**: In the period between January 1990 and December 2000, we identified 50 patients managed in this hospital with evidence of external injury resulting in renal trauma. Patients were divided into two groups; i) Patients with isolated renal injury (group A) and ii) renal injury associated with solid abdominal organ injury (group B). The two groups were compared. The severity of renal injury was classified by using the renal injury scale (I-V), which was published by the Organ Injury Scaling (O.I.S.) Committee of the American Association for the Surgery of Trauma (A.A.S.T.) in 1989[1]. **Results**: Sixty percent patients had associated organ involvement. Penetrating injuries were responsible for 47% patients in-group B compared to only 5% in group A ($p<0.001$). CT was the predominant radiological investigation in both groups. Spleen was the commonest intra-abdominal organ involved (70%). Mean grade of injury in group-A was 2.2 compared to 2.7 in group B. Operative management was done in 20% patients in group A compared to 29% in group B. Nephrectomy in both groups were performed only for grade V injuries. **Conclusions**: Exploration does not increase the rate of nephrectomy; in group B grade II-IV injuries when explored were all reconstructed. Penetrating injuries are more likely to cause associated organ injuries ($p<0.001$). Spleen is the commonest organ involved.

Key words: kidney, trauma, intra-abdominal organ, conservative, nephrectomy

INTRODUCTION

Advances in the imaging techniques have not only made evaluation of patients with renal trauma easier but has also impacted positively on the management. Majority of hemodynamically stable patients, with grade I-IV injuries are now managed conservatively[1]. In a recent review of experience in the management of blunt renal trauma, Danuser et al[2] noted significant decrease in the operative management in the period of 1989-1995 compared to 1973-1988.

The only absolute indication now for renal exploration is persistent bleeding; other relative indications include presence of non-viable tissue, urinary extravasations, incomplete staging and arterial thrombosis. In the absence of above factors, associated organ injury is a relative indication for operative management. Involvement of associated intra-abdominal organs like spleen; pancreas, bowel and liver with renal injuries have a higher rate of open operative management. This is often done to avert the potential of peri-renal infection[3] and

subsequent risk of secondary hemorrhage[4] of the injured kidney after intra-abdominal surgery. Hussmann[3] et al noted 100% incidence of peri-nephric infections in patients with co-existing colonic and/or pancreatic injuries managed expectantly. With this in mind, we reviewed our results in the last ten years in managing renal trauma. With this background we reviewed our experience to see if operative intervention for co-existing injuries to intra-abdominal organs increase the rate of nephrectomy for grade II-IV renal injuries.

METHODS

In the period between January 1990 and December 2000, we identified 50 patients managed in this hospital with evidence of external injury resulting in renal trauma. Patients were identified using ICD-9cm[5].

The relationships of genitourinary injury with associated organ injuries, age and gender of the patient, the mechanism of injury, the mode of treatment, the mortality and morbidity were evaluated.

Patients presenting to the emergency room with general abdominal trauma, and diagnosed and then hospitalised for renal trauma were included in the study. After initial clinical evaluation with history and physical examination, routine blood count, renal function test and urinalyses were preformed on each patient. All patients were subsequently evaluated radiologically using ultrasound, intravenous urogram (IVU) and/or CT Scan. Ultrasound was performed either as a screening test in vitally stable patients with no or minimal microscopic haematuria (2–5 erythrocytes/High Power Field) or as tool for continuous evaluation in patients managed conservatively. IVU was performed either as an emergency one shot IVU prior to laparotomy and after resuscitation and haemodynamic stabilization (systolic blood pressure of ≥90 mm Hg.) or in haemodynamically stable patients with haematuria but no clinical evidence of associated intra-abdominal organ involvement.

Patients were divided into two groups; i) Patients with isolated renal injury (group A), and ii) renal injury associated with solid abdominal organ injury (group B). There were 20 patients in Group A and 30 belonged to Group B. The two groups were compared. The severity of renal injury was classified by using the renal injury scale, which was published by the Organ Injury Scaling (OIS) Committee of the American Association for the Surgery of Trauma (AAST) in 1989[1]. Statistical analysis was performed on a commercially available software i.e. SPSS (statistical package for social sciences).

RESULTS

In the period between January 1990 and December 2000, 50 patients were identified. There were 20 patients in Group A and 30 belonged to Group B. Gender distribution between the two groups was similar (9:1 male to female). In-group A penetrating injuries accounted for only 5% of the patients whereas 95% had blunt abdominal trauma whereas in Group B 47% patient had penetrating injuries compared to 53% blunt abdominal injury. All patients in both groups had microscopic or gross haematuria. . In Group A 45% patients had a CT scan and the rest had ultrasound and/or IVU. In Group A 45% patients had a CT scan and the rest had ultrasound and / or IVU. In group B 3/4th of the patients were evaluated by CT scan and 1/4th by ultrasound and / or IVU.

Details of associated organ involvement are shown in Figure-1.

Mean grade of injury for Group A was 2.2±0.3 compared to Group B, which were 2.7±0.25 and is shown in Figure-2.

One fifth of the patients in group A and about a third in group B were managed by open surgery, the details of which are described in table-1.

Table-1: Intervention in relation to the grade of injury.

Grade (n)	Isolated Renal Injury n=20		Associated Organ Injury n=30	
	Operative	Conservative	Operative	Conservative
I (11)	-	7	-	4
II (18)	-	5	1	12
III (10)	-	5	1	4
IV (5)	1	2	2	-
V (6)	1	1	5	-

Complications were noted in 15% in group A and 16 % in group B. In group A one patient had significant bleeding requiring blood transfusions. One patient developed new onset hypertension and one patient developed a urinary fistula, which responded to placement of ureteric stent. In group B one patient each had significant bleeding, urinary fistula and a perinephric collection requiring percutaneous drainage whereas two patients developed new onset hypertension. In group A there was no mortality whereas in group B 10% died. The details of which are described in Table-2.

Table-2: Mortalities in Group B.

Age, Gender	**Mechanism**	**Grade**	**Operative procedure**	**Cause of de**
25 yrs, Male	Gunshot	Grade 5	Thoracotomy, spleenectomy, distal pancreastectomy, left nephrectomy	Cardiac arre

32 yrs, Male	Gunshot	Grade 5	Hepatic laceration and duodenal perforation repair, exteriorization of gastric antrum, Right nephrectomy	Hypovolumi shock
48 yrs, Male	Gunshot	Grade 2	Spleenectomy, loop colostomy, laminectomy	Anterolatera Myocardial Infarction, Aspiration pneumonia

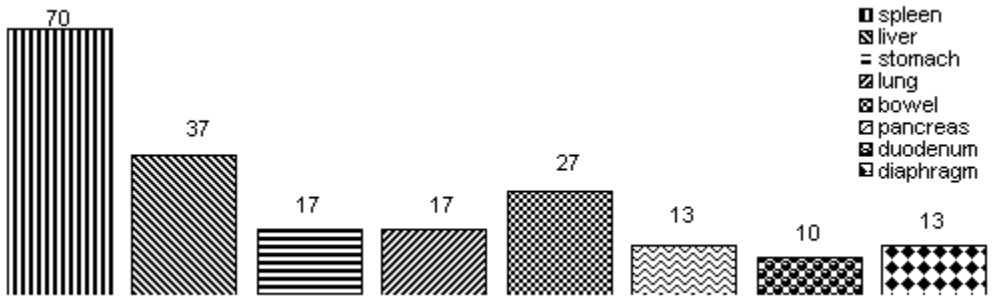
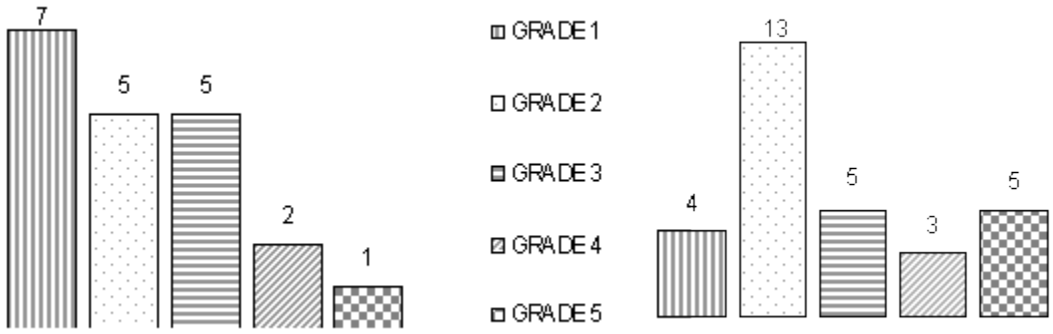


Figure-1: The frequency of associated organ injury



GROUP A **GROUP B**

Figure-2: Mean grade of injury for Group A and Group B

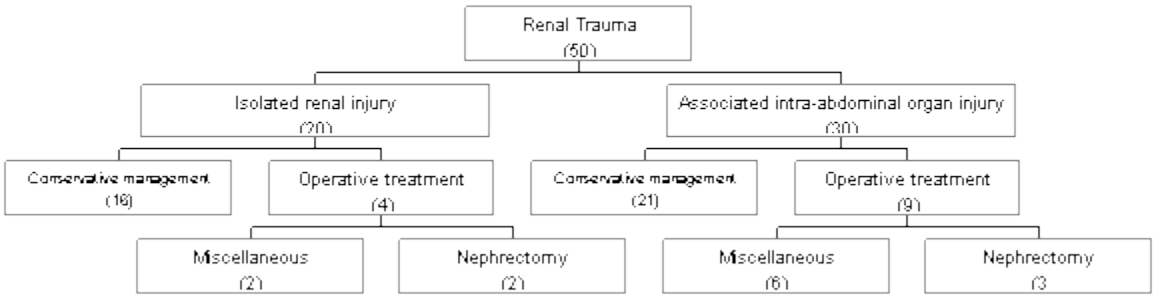


Figure-3: Distribution of patients in various treatment arms

[Miscellaneous= Procedures like drainage of haematoma, partial nephrectomy, repair of laceration]

Among four operative interventions in Group A one patient had a partial nephrectomy, another had a repair of parenchymal laceration and two patients had a nephrectomy. In Group B however, four patients had repair of laceration and drainage of haematoma while 2 had partial nephrectomy and three patients had a nephrectomy done (Figure-3).

DISCUSSION

Trauma is a leading cause of death in young population[4]. However, deaths related to renal injuries alone are rare. Mortality and morbidities are seen in patients with associated intra-abdominal organ injuries, and cerebral, thoracic and skeletal injuries. It is therefore important to assess the presence of related organs involved.

In the recent years with advances in radiological evaluation and increasing experience in the management vast majority of patients with renal trauma are managed conservatively. In the experience of McAninch et al[6] the frequency, of accompanying intra-abdominal organ injuries was 80%. In the present study incidence of accompanying intra-abdominal organ injuries was 60%. The most commonly involved organs were spleen followed by liver and bowel (Table-1).

All patients with injuries to the solid organs of the abdomen and who are haemodynamically stable should be considered candidates for non-operative management after their injuries have been staged by abdominal CT scanning. One limitation of CT in the presence of intra-abdominal organ injury is that the stage of the injury determined does not always predict which patients would require laparotomy[7]. These patients require close haemodynamic monitoring for early recognition of an associated hollow viscus injury in need of repair, if the non-operative approach fails.

Although delayed bleeding from the liver seems extremely rare, delayed rupture of the spleen and continued haemorrhage into the retro peritoneum from an injured kidney are not unusual, so patients with spleenic and renal injuries should be considered candidates for repeat imaging procedures before discharge. Others likely to benefit from a second look at their injuries include patients with sub capsular haematomas, patients with recognized extravasations on the initial scan, and athletes anxious to return to contact sports.

Experience from major trauma centres suggests that the incidence of missed intestinal injuries is low in adults and children managed non-operatively, but surgeons must be diligent in monitoring for increasing abdominal pain, abdominal distension, vomiting, and signs of inflammation, which may be delayed manifestations of intestinal disruption.

Patients with vascular injuries (grade V injuries to the spleen, liver, or kidney) may be candidates for interventional imaging procedure, such as angio-embolization or stenting, but some of these patients are best served by immediate laparotomy[7].

Patients with associated intra-abdominal injuries, however, often require laparotomy, which provides an opportunity to repair major renal lacerations and drain haematoma. The concern with this approach is that it may increase the rate of nephrectomy performed as an

expedient procedure to attain haemodynamic stability[8]. On the other hand, non-operative treatment in patients with pancreatic and colonic injuries places them at significant risk for associated urologic complications. Particularly patients who have colonic injuries are at an increased risk of septic complication with devitalizing renal injuries[3]. Once the abdomen is opened and intra-abdominal injuries are tackled in a stable patient, renal pedicle is isolated before exploring the kidney. This maneuver maximizes renal preservation and reconstruction of damaged kidney with minimal blood loss. Utilizing this approach McAninch et al[9] were able to achieve 88% renal salvage with minimal morbidity. However, proper patient selection is important as majority of patients with grade II and III injuries and no evidence of devitalized renal parenchyma and absence of pancreatic and colonic injuries could still be managed conservatively.

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