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Prospective observational study with an abbreviated protocol in the management of blunt renal injury in children

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ABSTRACT

Background: There are no published management schemes for blunt renal injuries. We are conducting a 2-center prospective observational study with a fixed management scheme.
Methods: Children with CT proven renal injuries were enrolled with permission. Ambulation is allowed when able regardless of grade. Discharge occurs when tolerating a diet and pain is controlled regardless of hematuria. Urinalysis occurs at follow up in 2–4 weeks and repeated as indicated.
Results: Between 9/2008 and 9/2012, 70 patients were enrolled. Mean age was 11.8 years (3–17), and 70% were male. The mean grade of injury was 2.8 ± 1.1 [1–5]. One nephrectomy (1.4%) was performed for a grade 5 injury. Other renal interventions included an embolization for the hilar bleed and one cystotomy for a clot. Mean LOS was 2.9 days ± 2.4 days. In patients without other major injury, LOS was 1.9 ± 1.7 days (0.4–8 days). There were 5 (7%) readmissions: 3 for pain, 1 for hematuria, and 1 for a bladder clot. 58 patients (83%) gave urinalysis samples at initial follow up (med 18 days), where 31 (53%) were positive for blood.
Conclusions: Children with blunt renal injury may benefit from management without strict bedrest guidelines. Hematuria appears to have little influence on recovery.

Over the past quarter of a century, management of blunt renal injuries has progressed toward primary non-operative management [1–6]. This trend has resulted in operative rates of 10% or less with renal salvage in 95% or more [1,2]. Therefore, there seems little need to pursue operative management in the face of renal injuries, similar to injuries of the spleen and liver. While several protocols have been published which dictate the hospital course in the non-operative management of spleen and liver injuries, there are no such protocols for renal injuries. The literature lacks definitive data on the hospital management of these patients [6]. We previously performed a retrospective review on renal injuries, in which we questioned the necessity for strict bedrest and the relevance of hematuria in the course of recovery [7]. Therefore, we designed a prospective observational study employing a management protocol without a mandatory period of bedrest that does not require resolution of hematuria prior to ambulation or discharge

1. Methods

After IRB approval (#08-07-110) patients identified by computed tomography (CT) as demonstrating blunt renal injury were approached for the study. Informed parental permission/patient assent was obtained during the initial hospitalization. The initial scan was graded according to the American Association for the Surgery of Kidney Injury Scale [8].

1.1. Protocol

The management protocol allows for ambulation when the patient is comfortable as is usual after any general abdominal operation. This is true regardless of grade or the presence of gross hematuria, therefore there is no minimum period of bedrest. Urinalysis was performed upon admission to the hospital. While hematuria is monitored, the presence of hematuria did not impact the allowance of ambulation or influence the decision of discharge from the hospital. Routine placement of a urinary catheter is avoided unless patients are unable to void. In addition, routine antibiotics are not given and routine urinary cultures are not obtained. Patients are managed by the trauma service and urology consults were not routinely obtained.

Discharge planning began when the patient tolerates a regular diet and oral pain medications. Urinalysis is evaluated at follow up

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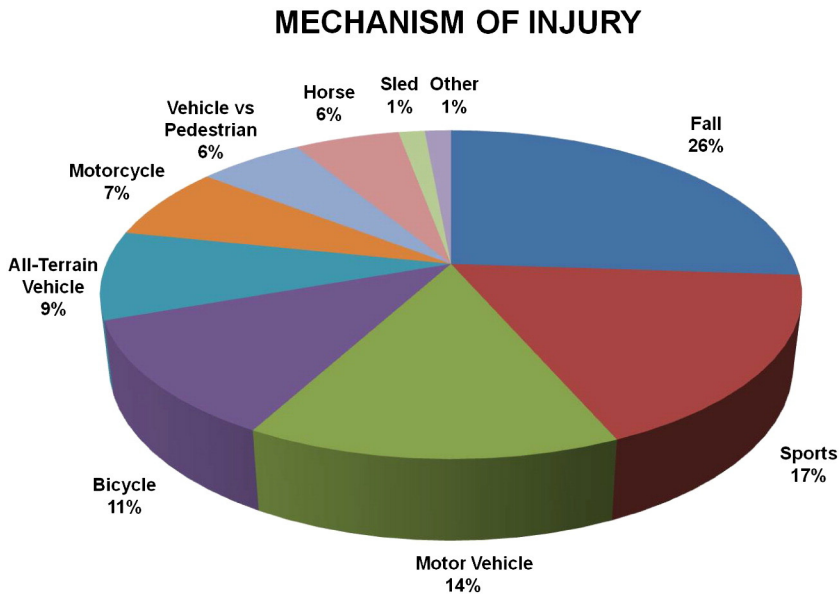

Fig. 1. Mechanisms responsible for renal injury.

2–4 weeks after discharge, and repeated as indicated. Imaging is performed for urinary extravasation or other specific concern on initial imaging. Patients are followed for the long-term blood pressure outcomes for 3 years which is not part this report.

1.2. Data collection/analysis

Patient demographics, mechanism of injury, associated injuries, hospital course, transfusions, operations and outcomes were recorded. Patients that required transfusions were analyzed to identify the dominant injury that likely accounted for the need for transfusion.

Associated injuries were defined as a fracture, intracranial blood, laceration requiring operative treatment, an abrasion requiring debridement/burn therapy, pneumothorax requiring intervention, or an additional organ injury. Injuries not considered associated included soft tissue injury, laceration closed at the bedside, concussion, untreated pneumothorax, pulmonary contusion that did not affect hospital stay and dental injury not requiring attention while in the hospital.

Data are expressed as mean ± standard deviation.

2. Results

Between 9/2008 and 9/2012, 70 patients were enrolled. Mechanisms of injury are depicted in Fig. 1. Mean age was 11.8 ± 4.0 years (3–17 years) with mean weight of 49.4 ± 21.2 kg (13–99 kg) and there were 49 (70%) males. Laterality of injury was 38 (54%) right, 31 (44%) left and 1 (1.4%) bilateral.

The mean grade of injury was 2.8 ± 1.1 (Fig. 2)[1–5]. Transfusions were used in 6 patients (8.6%), 5 of which were unrelated to renal injury with 1 (1.4%) due to a grade 5 injury and hilar vessel bleeding. One nephrectomy (1.4%) was performed for a devascularizing grade 5 injury. Other renal interventions included an angiographic embolization for the aforementioned hilar bleed and one cystotomy was performed for a clot in the bladder.

Mean time to ambulation was 1.5 ± 2.3 days (0–12 days). This includes 11 patients with concomitant injuries that prevented ambulation for 3 or more days (2–12 days), excluding these patients yielded a time of 0.8 ± 0.6 days (Table 1).

Mean duration of hospitalization was 2.9 days ± 2.4 days for the entire population. There were 42 patients (60%) who had no concomitant injuries that would prolong hospitalization. In those patients, duration of hospitalization was 1.9 ± 1.7 days (0.4–8 days). There were 5 (7%) readmissions, 3 for pain, 1 for worsening hematuria, and 1 for a bladder clot. The patient with bladder clot had hematuria and difficulty voiding. There were no patients who developed delayed bleeding or required subsequent transfusion after initial stability.

There was no urinalysis documented during hospitalization in 7 patients, of the remaining 63 patients, 60 (95%) were positive for blood. There were 58 patients (83%) who provided urinalysis samples at initial follow up (med 18 days) where 31 (53%) were positive for blood. Due to the fact that no patients demonstrated tachycardia or signs concerning for anemia, repeat blood counts were not performed.

Follow-up imaging was obtained in 10 patients (14%). In 9 of these patients, the indication for follow up imaging was concern for urinary extravasation on initial CT. They all underwent an ultrasound at follow-up and none were abnormal. The other patient had a perfectly circumscribed hematoma concerning for an underlying tumor and therefore a repeat CT was performed in 6 weeks demonstrating a

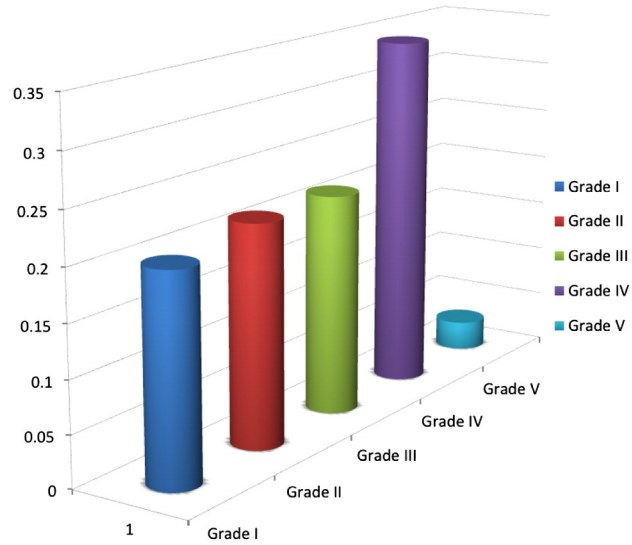

Fig. 2. Percentages of grades of injury for renal injury.