

## THREE CASES OF BLUNT RENAL TRAUMA IN CHILDREN

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### ABSTRACT

Traumatic injury to the kidney accounts for greater than 60 % of the pediatric genitourinary injuries. This case report highlights the various presentations of renal trauma in pediatric population and the management of children with blunt renal trauma, both conservative and operative approaches. Three cases of pediatric blunt renal injuries were managed by department of pediatric surgery at SRMC, Chennai from Oct 2005 to June 2007. Age of the patients ranged from 12 to 14 years (Mean – 13 Yrs). Mode of injury varied among the three cases. Two cases of

grade III renal injury were managed conservatively. One patient with grade V injury with transected kidney underwent nephrectomy. Conservative management including close observation with periodic assessment of blood hemoglobin, renal parameters, and ultrasound abdomen is effective even in grade III renal injury. Indications for surgery include expanding abdomen mass, fall in hematocrit or hemoglobin, deterioration of general condition of the patient.

**MesH words:** Blunt injury, child, kidney

### INTRODUCTION:

Blunt trauma is responsible for 90% of the genitourinary injuries in childhood, with approximately 90% having coexisting injuries to the thorax, spine, pelvis, femur or intra abdominal organs (1, 2). Traumatic injury to the kidney accounts for greater than 60 % of the pediatric genitourinary injuries (3,4,5,6. )

The pediatric kidney is believed to be more susceptible to trauma because it is protected by an immature, more pliable thoracic cage and weaker abdominal musculature, has less perirenal fat and sits in a lower position in the abdomen than its adult counterpart. In contrast to adults, in children, hematuria is very unreliable sign in determining the need to screen for renal injuries. In some studies there is no evidence of gross or microscopic hematuria in up to 70% children sustaining grade 2 or higher renal injury(1).

### DESCRIPTION OF CASES

During the period from October 2005 to June 2007, 3 cases of pediatric blunt renal trauma were managed by the Dept of Pediatric Surgery, SRMC, Chennai. We have reviewed the records retrospectively to study and analyze the various presentations and different modalities of management.

#### Case - 1

A twelve year old boy who sustained blunt abdominal injury following fall from the bicycle 2 days prior, presented to casualty with history of passing red coloured urine. On examination, right iliac and lumbar region tenderness with a diffuse swelling 2cm x 3 cm was found. Blood was seen at the urethral meatus. Patient

had associated forehead laceration and ecchymosis around the right eye. CT scan abdomen revealed contusion of lower pole of right kidney, with perinephric hematoma and renal parenchymal laceration of 1.5cm (grade-3 renal injury). At admission Hemoglobin was 10.5 gm%, blood counts, urine analysis, renal function tests and serum electrolytes were normal. On day 2 and day 4 of admission hemoglobin levels, RFT and serum electrolytes were normal. Patient was managed conservatively with IV antibiotics, analgesics and close monitoring of vitals. The mass and tenderness decreased significantly and vitals were stable. Ultrasound abdomen on day 10 showed resolution of the mass, but with residual perinephric hematoma. Patient was discharged on day 11 with oral antibiotics for 5 days. During follow up at 1 month as outpatient, child was afebrile; BP recording was 106/70 mm of Hg, USG abdomen showed near complete resolution of perinephric hematoma. During further follow up at 3,6 and 9 months the child was asymptomatic, BP recording was normal and USG abdomen normal.

#### Case – 2

Thirteen year old boy with history of slip and fall on the ground while playing a day back, presented to emergency room with complaints of lower abdomen pain and back pain since the time of injury, history of hematuria 4-5 episodes and 2 episodes of non bilious vomiting. On examination vitals were stable, tenderness present in the left lumbar region with mild guarding. At admission USG abdomen showed features suggestive of renal injury. CT scan with contrast done on the same day revealed laceration of renal parenchyma with perinephric collection suggestive of grade III renal injury. Urine microscopy showed granular casts, plenty of RBCs and pus cells, urine protein positive. Hemoglobin level, RFT and serum electrolytes were normal. On day 9 USG abdomen showed resolving renal contusion and perinephric hematoma.

Patient was managed conservatively with IV fluids, IV antibiotics, analgesics and absolute bed rest. Tenderness decreased over a period of 1 week. Patient was discharged

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on day 10 with oral cotrimoxazole for 5 days. On follow up at 1 month child was afebrile, BP recording was 112/70 mm of Hg. USG abdomen showed resolution of renal contusion and perinephric hematoma. During further follow up at 3 and 6 months child was normotensive and USG abdomen was normal.

**Case - 3**

Fourteen year old boy referred from Andaman and Nicobar islands, with history of right loin pain following fall from a height, 2 days back. No history of hematuria. On examination vitals were stable, tenderness and diffuse mass in the right loin. Patient was admitted, CT scan done on day 1 shows, total disruption of the lower pole along with the pelviureteric junction (Figure-1, 2). Hemoglobin was 8.9 gm%, urine microscopy, RFT and LFT were normal. Two units of packed cells were transfused in the ward. Child was taken up for exploratory laparotomy on day 3 in view of gross hematuria, expanding abdominal mass and increasing biliary aspirate.



**Figure-1** Contrast CT scan showing laceration of right renal parenchyma with perinephric collection.



**Figure-2** Three dimensional reconstruction of contrast CT showing right kidney laceration and contrast extravasation with non visualization of right ureter

Operative findings include full thickness total laceration of right kidney transversely into two pieces with

a perinephric hematoma. (Figure-3) suggestive of grade 5 renal injury. The lower half was separated completely along with renal pelvis and ureter. There was a hematoma in the duodenum and no other bowel injury was present. On evacuating the hematoma blood gushed from the junction of renal vein and inferior vena cava, kidney became pale. Vascular surgeon opinion was sought. As the kidney could not be salvaged right nephrectomy was done after isolating the renal pedicle (Figure-4). Estimated intra operative blood loss was 2 liters. Three units of whole blood and 1 unit of FFP were transfused. Patient made satisfactory recovery in the post operative period.



**Figure-3** Operative photograph showing perirenal hematoma



**Figure-4** Nephrectomy specimen showing full thickness transverse laceration of kidney with pelvis and ureter attached to lower pole.

Post operative hemoglobin, WBC count, RFT & Electrolytes were normal. Child was discharged on 9<sup>th</sup> post operative day. During follow up at 1 month child was afebrile and BP recording was 114/72mm of Hg. On further follow up at 3 and 6 months child was normal clinically, BP recording and USG abdomen were normal.

**DISCUSSION**

Blunt renal trauma in children is the commonest pediatric genitourinary injury. Presenting features in our study group includes hematuria, loin pain, and loin mass.

Focused assessment with sonography for Trauma (FAST) is operator and experience dependent. A FAST scan that is negative for intra abdominal injuries combined with normal serial physical examinations over a 24 hour period of observation will virtually rule out the presence of significant

intra abdominal injuries(7). In the clinically stable patient triphasic abdominal and pelvic CT is the most sensitive method for diagnosis and classification of genitourinary trauma(1,2). Single shot intra venous pyelography taken 10-15 minutes after injection of contrast in the operating room is helpful in detecting a normally functioning contralateral kidney if unilateral nephrectomy is a consideration.

Super selective angiographic embolization of renal artery branches for persistent or secondary hemorrhage has a success rate approaching 80 %. Repeat CT scan 2 to 3 days after the trauma in renal injuries of grade III and above is recommended(2). In our study a follow up ultrasound scan was done before discharge of conservatively managed patients. Classification of renal trauma into 5 grades guides the treatment modality (Table-1)(8).

**Table-1 Classification of Renal Injuries**

Grade of renal injury		Description
I	Contusion Hematoma	Microscopic or gross hematuria; urologic studies normal Subcapsular, nonexpanding without parenchymal laceration
II	Hematoma Laceration	Nonexpanding perirenal hematoma confined to retroperitoneum < 1cm parenchymal depth of renal cortex without urinary extravasation
III	Laceration	> 1cm parenchymal laceration depth without collecting system rupture or urinary extravasations
IV	Laceration Vascular	Laceration extending into collecting system with urinary extravasations. Injury to renal vasculature with contained hematoma.
V	Laceration Vascular	Completely shattered kidney Renal hilar avulsion that devascularizes kidney

Ideal candidate for non operative management is the hemodynamically stable patient with grade I or II renal injury<sup>2</sup>. Patients with isolated grade 3, 4 and 5 renal injuries are also candidates for non operative treatment(1, 2). Non operative therapy consists of bed rest, close monitoring of vital signs and urine output, serial abdominal examinations, serial hemoglobin determination, transfusion as indicated and intravenous broad spectrum antibiotics. In our study 2 children with grade 3 injuries managed with the above protocol recovered satisfactorily and were discharged from the hospital without any complications.

Absolute indications for renal exploration after trauma include hemodynamic instability due to renal bleeding, expanding or pulsatile retroperitoneal hematoma and

inability to stop persistent or delayed hemorrhage via selective vascular embolization. Nephrectomy should be considered in irreparable grade 4 and 5 renal injuries. Only one child underwent nephrectomy for grade 5 renal injury (shattered kidney) among the cases reported here.

Trauma induced renal vascular hypertension occurs after a grade 3 or higher injuries in approximately 5% (2). Common causes of renal hypertension are renal ischemia from segmental arterial occlusion, main renal arterial occlusion with intact peripheral blood flow to the kidney and a trauma induced arteriovenous malformation. In this case report, so far none of the children have developed these complications when examined during follow up. However further follow up is required to detect whether these complications occur.

Although no conclusion can be drawn from a series involving 3 patients, it is our observation that renal injury can present with varied symptoms at different age groups. Classification of renal injury and grading helps in deciding whether conservative or operative management is required. Conservative management has a role in grade 3 and higher renal injuries provided patient is hemodynamically stable and closely monitored in a tertiary referral centre like ours.

#### REFERENCES:

1. Buckely J, Mc Aninch J: Pediatric renal injuries: Management guidelines from a 25 year experience. *J Urol* 2004; 172: 687-690.
2. Santucci R, Wessells H, Bartsch G, et al: Evaluation and management of renal injuries: Consensus statement of the renal trauma subcommittee BJU Int 2004 b; 93: 937 – 954.
3. Levy JB, Baskin LS, Ewalt DH, et al. Non operative management of blunt pediatric major renal trauma. *J. Urology* 1993; 42: 418-424.
4. Santucci RA, Mc Aninch JM, grade IV renal injuries: Evaluator treatment and outcome. *World J. Surg.* 2001 Dec; 25 (12) :1565-7
5. Santucci R, Langenburg S, Zachareas M: Traumatic hematuria in children can be evaluated as in adults. *J Urol* 2004 a; 171: 822-825.
6. Douglas Husmann: Pediatric Genitourinary Trauma: Campbell – Walsh Urology, 9<sup>th</sup> Edition; Saunders Elsevier, Philadelphia 2007; 3929-3945.
7. Santucci RA, MC Aninch JW. Diagnosis and management of renal trauma: past, present and future. *J. Am coll surg* – 2000Oct; 191(4): 443-51.
8. Moore EE, Shackford SR, Pachter HL, et al: Organ injury scaling: Spleen, liver and kidney. *J Trauma* 1989; 29:1664.