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Unusual Course of Renal Trauma in a Toddler in a Tertiary Care Hospital

Dr. Sangeeta Tripathy

Professor & HoD, Department of Radiology, PGICH, Sec-30, Noida, India

Corresponding Author: **Dr. Sangeeta Tripathy**

Abstract

Renal trauma can be from direct, blunt, penetrating and iatrogenic injury. Renal injuries are accounting for 10% of abdominal trauma. In our case the renal injury of the toddler is due to blunt injury. Depending upon the preexisting congenital or acquired renal pathology, its incidence increases. Blunt trauma comprises more than 95% of traumatic renal injury. Patients with renal trauma present with flank and/ or abdominal pain.

Children are at higher risk of renal injury from blunt trauma than adults but no pediatric renal trauma guidelines have been established. Computed Tomography (CT) is the

investigation of choice in the evaluation of blunt renal injury as our case. Ultrasound (USG) is helpful in detecting hemoperitoneum in patients with suspected intraperitoneal injury but less value in evaluating those with suspected extraperitoneal injury. FAST (Fast Abdominal Sonography for Trauma), thus is important. Renal angiogram, in some cases MRI or renal scintigraphy may be useful.

In our case, a toddler with blunt injury abdomen checked from April 2022 to April 2023 where a grade IV injury of right kidney with huge collection reduced to grade II-III hydronephrosis. The case was conservatively managed.

Keywords: Renal Injury, Blunt Trauma, USG, CT

Introduction

The isolated renal trauma in vast majority is minor (95-98%) and major renal injuries are less common as kidneys are located in retroperitoneum. Blunt trauma from falls, motor vehicle crashes etc are the important cause of renal injury in 85% of cases, the mechanism being deceleration injuries from collision of kidney with vertebral column or thoracic cage. The spectrum of renal injuries include-contusion/ hematoma, laceration hemorrhage, avulsion of renal pedicle, AV- fistula, Pseudo-aneurysm, renal artery thrombosis etc.

Kidney is the most commonly involved organ associated with urologic trauma and involved in 1-20% of trauma cases, kidney injuries take place between 1-5% on average [6,7].

Excretory phase CT is Important for detection of collecting system injury.

Computed tomography (CT) is the investigation of choice in the evaluation of blunt renal injury. Ultrasonography is helpful in detecting hemoperitoneum in patients with suspected intraperitoneal injury. IVP (Introvenous pyelography) is used basically for gross assessment of renal function in hemodynamically unstable patients. Selective renal arteriography and venography is useful for providing information regarding vascular injury.

The American association for the surgery of trauma (AAST), organ injury scale (OIS), the most commonly used grading system updated in 2018 and incorporates imaging findings from contrast enhanced CT.

The primary goal of acute renal trauma is to optimize patients' survival and preserve renal function.

Case Report

The child is 3yrs old who fell down from 3rd floor and sustained injury to right kidney. There is no LOC, Seizure, or ENT bleed. Two episodes of vomiting was there with abdominal pain complaint. Ultrasonography done after 4 days of fall showed that there was no hemoperitoneum and there is large collection with low level echos of size (13.7x7.0cm) at right mid and lower pole of kidney (Fig 1, 2) with mild dilation of collecting system of right upper pole suggestive of injury to collecting system of right kidney. On doppler, vascular supply to upper pole of right kidney was normal.



Fig 1: USG showing collection in right kidney Mid and lower pole



Fig 2: Showing vascular supply to right kidney upper pole

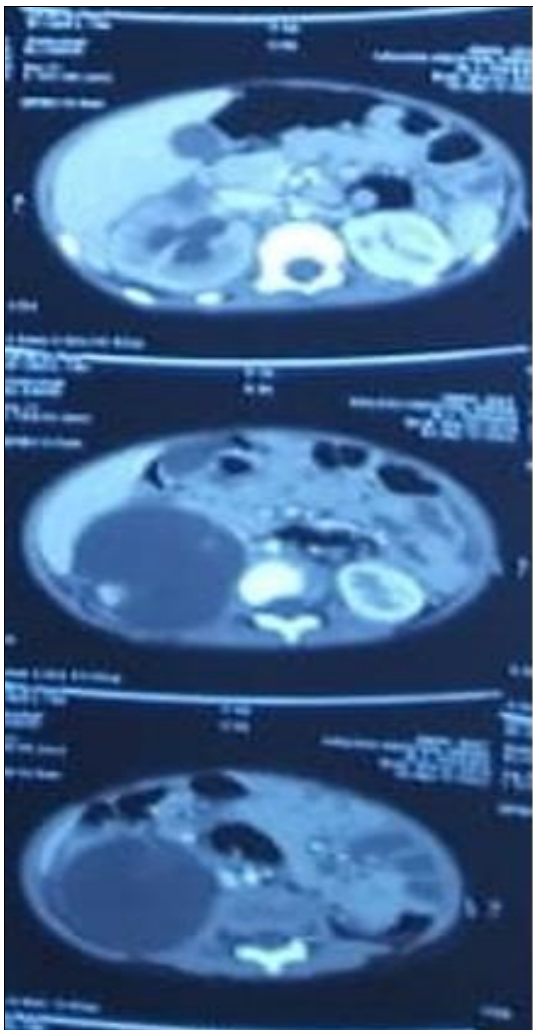


Fig 3, 4 and 5: Showing enlarged right kidney with large collection

CECT abdomen also done few days after the injury which describes multiple lacerations in right kidney with subcapsular collection showing extravasation of contrast with large collection at mid and lower pole of right kidney with hyperdense areas within? hemorrhage and likely extravasation of contrast in delayed study- possible injury to collecting system with right moderate hydronephrosis suggestive of gr-IV renal injury according to AAST (American association for the surgery for trauma) guidelines with minimal ascites and multiple laceration in liver (Fig 3, 4 and 5).

Renal angiogram unremarkable. Renal Dynamic study (DTPA) with GFR estimation done after 9 months demonstrate non functioning right kidney. (Fig 6, 7).



Fig 6 and 7: Renal angiogram unremarkable

Repeat ultrasonography of KUB has shown right kidney slowly reduced in size with large collection in right mid and lower pole and mild dilation of collecting system of upper pole. From right renal size 13.8x7.0 cm is slowly reduced to 6.4 x 2.9 cm, with disappearance of large mid and lower pole collection and hydronephrotic kidney gr-II-III (Fig 8, 9). The right ureter not dilated. The grade IV injury according to AAST, now reduced to 6.4 x 2.9 cm with gr-II-III hydronephrotic right kidney after almost 10 months.



Fig 8



Fig 9: Hydronephrotic right kidney noted after almost one year of Renal injury

Repeat ultrasonography KUB after two months revealed that there is gr-II-III hydronephrotic kidney. Upper pole calyceal dilatation is more with thinning of renal parenchyma. Ultrasonography done after almost one year, shows gr-II-III hydronephrosis with upper calyceal dilatation more than lower pole or mid pole. Patient is stable.

Discussion

Blunt renal injuries accounting for 71-95% of renal trauma cases are more common than penetrating injuries [7, 8] motor vehicle accidents are main cause of blunt trauma, followed by fall, sports and pedestrian accidents [9, 10].

Physical exam: attention paid to symptoms suggestive of kidney injury such as gross hematuria, flank hematoma, flank ecchymoses and tenderness, rib #, pelvic pain etc [7, 8, 11, 13]. Lab tests- Besides urine analysis, CBC and kidney function tests to detect renal function [8, 13].

Focused abdominal sonography for trauma (FAST) exam is the first step to detect hemoperitoneum, CT with intravenous contrast is the gold standard in blunt trauma to find out intrabdominal and retroperitoneal injuries in stable patients. A renal arteriogram must be done in suspected arterial injury [14, 15].

Localisation of vascular injury can be done by angiography and there by intervention can be undertaken [1, 2]. CT or intravenous pyelogram (IVP) done preoperatively, but grade 5 renal injuries may not be stable enough to undergo such investigations (1). Repeat CT may be required in case of falling hematocrit or persistent pyrexia (1).

Gr-I and II injuries managed conservatively (1). Presently non-operative management for gr-III injury is followed [3]. Conservative management of gr-IV renal injuries in the majority of cases preserves renal function as measured by

dimercaptosuccinic acid renal scintigraphy. This is a recent prospective, multicenter observational study [4]. In our study, gr-IV renal injury, managed conservatively for last one year. Around one quarter of gr-IV renal injuries are managed conservatively (1). A systematic review and meta analysis of non operative management of non vascular gr-IV pediatric renal trauma concluded that the non operative approach was highly successful with partial renal preservation achieved in 95% of patients [5].

Grade-V renal trauma have poor outcome in terms of renal function and may be there is need for emergency intervention.

According to AAST, conservative treatment approach is referred in gr-I-II and hemodynamically stable grade-III and IV renal injuries. Non operative approach with active monitoring done in the presence of hemodynamically stable in grade-IV and V cases. It is found that non operative management provides approximately 84-100% kidney preservation [8, 13, 16, 17] and upto 95% of blunt renal injuries are minor, conservatively managed.

Conclusion

FAST is the first step to detect hemoperitoneum. CT with IV contrast is the gold standard in renal trauma to find out the intra abdominal and retroperitoneal injuries in stable patients. Renal arteriogram required in suspected arterial injury.

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