Case report

DOI: <http://doi.org/10.4038/slju.v14i0.4092>

Conservative management of a child with a complete renal fracture with intact blood supply to two fragments following trauma

N. D. Weeratunga Arachchige¹, N. Liyanapathirana², M. B. Navarathne¹, C. U. Sandamali¹, U. S. Fernando¹ and A. L. Sabarathnam¹

¹Department of Paediatric Surgery, Teaching Hospital Anuradhapura, Sri Lanka.

²Department of Urology, Teaching Hospital Anuradhapura, Sri Lanka.

Introduction

Conservative management of paediatric renal trauma is increasingly recognized presently (1). The main aim of this strategy is to preserve renal parenchyma. Strict monitoring and minimally invasive techniques such as stenting, drainage, and angioembolization are considered to be the strategic options. This case study discuss the successful management of a young girl with a severe renal injury.

An 8 year old girl suffered from blunt abdominal trauma falling on to a cemented pot while cycling. She presented with right loin pain and subsequent visible hematuria and was admitted to the Paediatric Surgical Unit of Teaching Hospital Anuradhapura, Sri Lanka.

On admission she had features of class II shock and was resuscitated. Her Full Blood Count revealed 8.2g/dl of haemoglobin needing a blood transfusion. A FAST showed grade IV right renal laceration with large perinephric collection. Subsequently, a CECT abdomen was performed which revealed Grade IV right renal laceration extending to the renal pelvis leading to a separation of the kidney into two fragments with retained blood supply. Further, a large perinephric haematoma and a significant contrast leakage forming an urinoma was noted (Figure 1).

The child was managed in the Paediatric Intensive Care Unit (PICU) with intravenous antibiotics and bed rest. Parameters were improved initially but she developed abdominal pain with fever and ultrasound scan (USS) revealed an expanding urinoma. Ureteric stent (3Fr/16cm) was inserted on the third day after performing a cystoscopy and retrograde on-table contrast study which demonstrated a significant extravasation and pooling of contrast. Proximal end of the stent was maneuvered to the level of extravasation between two renal fragments to ensure adequate drainage.

Figure 1. Axial reconstruction of CECT demonstrating grade IV renal laceration.

Despite having the stent, she continued to have fever and pain with residual urinoma which was drained with ultrasound guided perinephric pigtail catheter. Subsequently her fever subsided on day seven and sent back to the ward.

Intra venous urogram (IVU) at 2 weeks revealed no extravasation of urine (Figure 2). Since she had a low output from the drain, and was discharged with uroprophylaxis. The drain was removed in 4 weeks and stent after 8 weeks. Her parameters including renal function and blood pressure were reviewed closely which were normal. DMSA scan after 6 months follow-up showed a scar in the middle of the kidney however, renal function was well preserved (Figure 3).

Figure 2. Intravenous urogram demonstrating stent placement with no extravasation of urine.

Figure 3. DMSA Renogram demonstrating well preserved renal.

Discussion

Renal trauma is rare in children and complete transection of the kidney with intact blood supply to two segments is even rarer. According to the literature, transected kidney with intact vascularity may not be amenable for conservative approach (2,6). However, this case study highlights a conservative management of a bisected kidney due to blunt trauma with a successful outcome.

There are no definitive guidelines for imaging in paediatric renal trauma but some authors recommend

close monitoring with repeat imaging within the first 72-hours (3). Although FAST is useful in initial diagnosis of abdominal trauma and can delineate renal lacerations, it's inferior to CECT Urogram (CT/IVU) in differentiating extravasated urine from blood. CT/IVU is considered the gold standard in diagnosing renal trauma, which can accurately detect lacerations, urinary extravasations and renovascular injury. Initial assessment was done with CECT in this child and subsequent evaluation for integrity of the excretory system and possible complications were assessed with IVU which carries less radiation with satisfactory details. DMSA during follow-up is useful for assessment of the functional outcome as a primary choice.

Conservative management of blunt renal trauma in children is inconsistent throughout the literature (2). This includes fluid resuscitation, frequent monitoring of vital signs, hemoglobin/ hematocrit measurement, frequent abdominal examination and bed rest until resolution of gross haematuria (2). It is recommended to keep a child in an intensive care unit for 24hrs to a week (3).

There is no consensus to use empirical antibiotics (4), however considering the degree of urinary extravasation, child was started on empiric antibiotics but later changed according to the culture from the drain.

Conservative approach should be considered in all grades of renal trauma in children initially (2). Immediate surgical intervention may be performed if a patient is haemodynamically unstable despite adequate resuscitation in grade IV and V injuries (2). However, this can lead to a higher incidence of nephrectomy (5). Complete renal transection with intact perfusion to each fragment represents a subset of grade IV injury. According to the literature, these patients have a decreased likelihood of spontaneous resolution (6) and also devascularised fragments have a high morbidity and need early surgical intervention (7).

Adult literature shows significant reduction of exploration or surgical intervention of severe renal injury by adopting early minimal invasive therapy, including percutaneous drainage of the urinoma, double J stenting and angioembolization (9,10). Indications for a drainage and/or stenting are large urinary extravasation, expanding urinoma and infected urinoma (4). This girl had all three indications and thus we performed both stenting and percutaneous drainage. The timing of stenting and drainage is varied from two days to 5 weeks (2).

This patient's DMSA scan after 6 months showed preserved renal function on both fragments with a scar in the middle of the kidney. This is compatible with the evidence from the literature (8).

Secondary hypertension is not a common finding following conservative management of a renal trauma in children (2) and if at all documented, it's easily manageable. She has been normotensive for 1 year.

Conclusion

This is a case study that discussed an extreme end of grade IV renal injury which is a fragmentation of the kidney into two halves with intact blood supply to both fragments with a ruptured collecting system leading to an expanding urinoma. Initial resuscitation, serial imaging, prompt minimal invasive intervention with stenting and percutaneous drainage of urinary extravasations, preserved the kidney with a good functional outcome without secondary hypertension.

Acknowledgement

I sincerely thank the Department of Radiology, Teaching Hospital, Anuradhapura and Prof N. D. Perera, Consultant Urological Surgeon, NHSL and Dr. A. K. Lamahewage Consultant Paediatric Surgeon, Head of the Department of Paediatric Surgery, Lady Ridgeway Hospital for Children, Colombo.

References

1. Broghammer JA, Langenburg SE, Smith SJ, Santucci RA. Pediatric blunt renal trauma: its conservative management and patterns of associated injuries. *Urology*. 2006; 67(4): 823-7.
2. LeeVan E et al. Management of pediatric blunt renal trauma: A systematic review. *J Trauma Acute Care Surg* 3: 519-28.
3. Buckley JC, McAninch JW. Pediatric renal injuries: management guidelines from a 25-year experience. *J Urol*. 2004; 172(2): 687-90.
4. Wessel L, Scholz S, Jester I, Arnold R, Lorenz C, Hosie S, Wirth H, Waag K. Management of kidney injuries in children with blunt abdominal trauma. *J Pediatr Surg*. 2000; 35(9): 1326-30.
5. Jacobs MA, Hotaling JM, Mueller BA, Koyle M, Rivara F, Voelzke BB. Conservative management vs early surgery for high grade pediatric renal trauma; do nephrectomy rates differ? *J Uro*. 2012; 187(5):1817-22.
6. Rogers CG, Knight V, MacUra KJ, Ziegfeld S, Paidas CN, Mathews RI. High-grade renal injuries in children – is conservative management possible? *Urology*. 2004; 64(3): 574-9.
7. Husmann DA, Gillig PJ, Perry MO, et al. Major renal lacerations with a devitalized fragment following blunt abdominal trauma: a comparison between nonoperative (expectant) versus surgical management. *J Urol* 1993; 150: 1774-77.
8. Nerli R, Metgud T, Patil S, Guntaka A, Umashankar P, Hiremath M, Suresh S. Severe renal injuries in children following blunt abdominal trauma: selective management and outcome. *Pediatr Surg Int*. 2011; 27(11): 1213-16.
9. Haas CA, et al. Use of ureteral stents in the management of major renal trauma with urinary extravasation: is there a role? *J Endourol*, 1998. 12: 545.
10. EAU Guidelines. Edn. presented at the EAU Annual Congress, Amsterdam, the Netherlands, 2020. ISBN 978-94-92671-07-3.