Medicine & Clinical Science

Case Report

Blunt Renal Trauma in a Patient With a Congenital Solitary Kidney: A Case Report

Mamadou Beye[1]*; Binta Sakho[2]; Sidy Mohamed A. Fall[1]; Babacar Mbengue[3]; Thieyacine Mouhamet Ndiaye[1]; Dialtabé Ibrahima G. Ba[4]

[1]Department of Urology, Heinrich Lübke Regional Hospital, Diourbel, Senegal
[2]Department of Nephrology and Hemodialysis, Heinrich Lübke Regional Hospital, Diourbel, Senegal
[3]Department of General Surgery, Heinrich Lübke Regional Hospital, Diourbel, Senegal
[4]Department of Cardiovascular and Thoracic Surgery, Heinrich Lübke Regional Hospital, Diourbel, Senegal

*Correspondence
Mamadou Beye, MD
Department of Urology, Heinrich Lübke Regional Hospital, Diourbel, Senegal.
ORCID: 0009-0009-9295-3709

- Received Date: 04 Apil 2026
- Accepted Date: 12 May 2026
- Publication Date: 15 May 2026

Keywords

kidney; wounds, nonpenetrating; solitary kidney; renal agenesis; conservative treatment; case reports.

Copyright

© 2026 Authors. This is an open- access article distributed under the terms of the Creative Commons Attribution 4.0 International license.

Abstract

Introduction: *Blunt renal trauma in a patient with a congenital solitary kidney is a rare but potentially life-threatening clinical scenario. Conservative management has progressively become the standard of care for blunt renal trauma in hemodynamically stable patients, irrespective of injury grade.*

Case Description: *A 25-year-old previously healthy man was admitted to the emergency department of Diourbel Regional Hospital after a horse-kick to the right lumbar region. He reported severe right-sided lumbar pain associated with gross hematuria and clots, and was hemodynamically stable on admission. Abdominopelvic CT revealed a deep parenchymal laceration measuring more than 4 cm in the mid-inferior portion of the right kidney, with subcapsular and perirenal hematoma but without contrast extravasation, classified as American Association for the Surgery of Trauma (AAST) grade III. CT also incidentally demonstrated complete absence of the left kidney, consistent with congenital renal agenesis. Given hemodynamic stability and the absence of urinary extravasation or vascular injury, conservative management was elected. At 3-month follow-up, the patient was asymptomatic, no complications were observed, and renal function was preserved.*

Conclusions: *Conservative management of blunt renal trauma on a solitary kidney is feasible and effective in hemodynamically stable patients, regardless of AAST injury grade, in line with current guidelines. Structured long-term nephrology follow-up is mandatory in this population because of the cumulative risks of post-traumatic hypertension, proteinuria, and chronic kidney disease.*

Introduction

The kidney is the most frequently injured genitourinary organ in trauma, involved in approximately 1% to 5% of all trauma admissions and up to 10% of abdominal trauma cases [1-3] Blunt mechanisms predominate, particularly in low- and middle-income countries [4]. Over the past two decades, nonoperative management has progressively emerged as the standard of care for the vast majority of blunt renal injuries, regardless of grade, provided that the patient is hemodynamically stable [5,6].

Unilateral renal agenesis is a rare congenital anomaly, with an estimated prevalence of 1 in 1,000 to 1 in 2,000 live births and a male predominance [7,8]. It is most often discovered incidentally during imaging performed for an unrelated indication, including trauma. The combination of these two conditions—blunt trauma occurring on a congenital solitary kidney—creates a particularly delicate management situation, since any decision toward nephrectomy would commit the patient to end-stage renal disease and lifelong renal replacement therapy.

We report the case of a young man successfully managed conservatively for an AAST grade III blunt renal injury occurring on a left renal agenesis, and we discuss the key elements of current management of renal trauma in patients with a solitary kidney. This case report was prepared in accordance with the CARE guidelines for case reports [9].

Case Report

A 25-year-old male farmer, with no relevant past medical history, presented to the emergency department after blunt trauma to the right lumbar region. The reported mechanism was a kick from a horse approximately 2 hours earlier.

On admission, the patient was conscious with a Glasgow Coma Scale score of 15/15. Mucous membranes were normally colored and hemodynamic tolerance was good: blood pressure 120/70 mm Hg, heart rate 72 beats/min, respiratory rate 16/min, peripheral oxygen saturation 96% on room air, and tympanic temperature 37°C. Abdominal examination revealed diffuse tenderness on palpation, predominating in the right lumbar region,

Citation: Beye M, Sakho B, Fall SMA, Mbengue B, Ndiaye TM, Ba DIG. Blunt Renal Trauma in a Patient With a Congenital Solitary Kidney: A Case Report. Med Clin Sci. 2026;8(2):060

without guarding or rebound, and with no palpable mass or cutaneous hematoma. Examination of the external genitalia and pelvic examination were unremarkable.

Emergency laboratory workup showed a hemoglobin level of 11.4 g/dL, normal white blood-cell and platelet counts, serum creatinine of 88 µmol/L (1.0 mg/dL), normal urea, and a normal coagulation profile. Blood typing was performed in anticipation of possible transfusion. Urine dipstick confirmed gross hematuria with no other abnormality.

A contrast-enhanced CT urogram was performed urgently. It revealed, in the right kidney, a deep parenchymal laceration measuring more than 4 cm involving the mid-inferior portion, with a moderate subcapsular and perirenal hematoma. There was no active enhancement on the arterial phase and no contrast extravasation on the delayed excretory phase; the collecting system was intact and the renal vascular pedicle was patent. On the left side, no renal parenchyma was identified, consistent with congenital left renal agenesis (Figures 1 and 2). The other intra-abdominal organs were unremarkable.

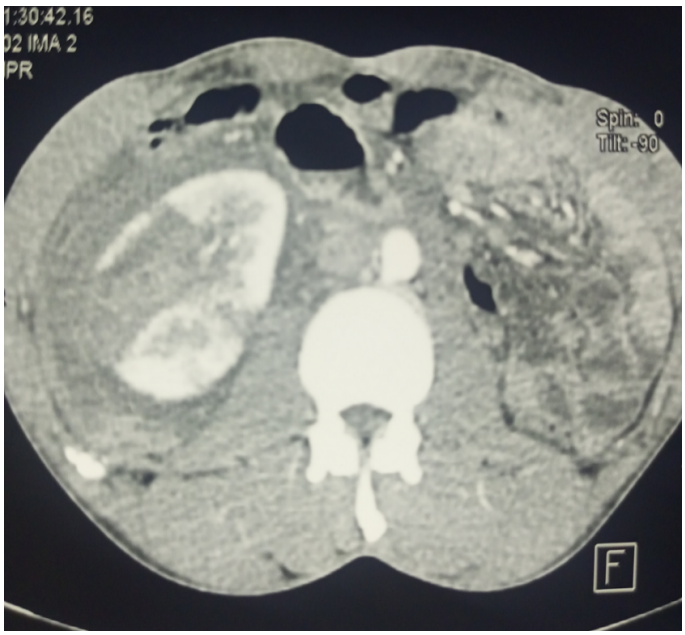

Figure 1. *Contrast-enhanced CT urography (coronal view). Deep parenchymal laceration greater than 4 cm in the mid-inferior portion of the right kidney with subcapsular and perirenal hematoma; complete absence of the left renal parenchyma consistent with congenital left renal agenesis.*

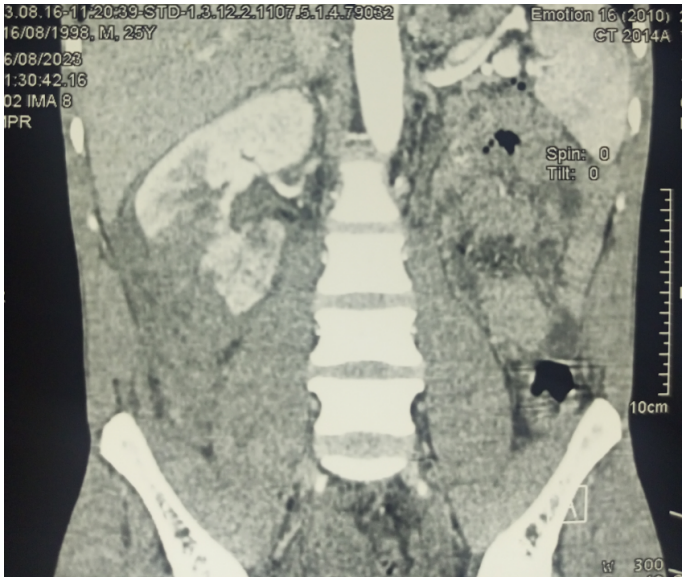

Figure 2. *Contrast-enhanced CT urography (axial view). Same lesion as in Figure 1, with no contrast extravasation on the delayed excretory phase, supporting AAST grade III classification.*

The final diagnosis was AAST grade III blunt right renal trauma occurring on a congenital solitary kidney (left renal agenesis).

Given hemodynamic stability, the absence of urinary extravasation, and an intact renal vascular pedicle, conservative management was decided after multidisciplinary discussion. Treatment included strict bed rest in a step-down monitoring unit; multimodal analgesia with acetaminophen and tramadol, with deliberate avoidance of nonsteroidal anti-inflammatory drugs (NSAIDs) because of the solitary-kidney status; moderate intravenous crystalloid hydration; antibiotic prophylaxis with a second-generation cephalosporin in view of urinary catheterization and the perirenal hematoma; and a three-way urinary catheter with continuous isotonic-saline bladder irrigation to prevent clot retention.

The clinical course was favorable: gross hematuria resolved within 48 hours, lumbar pain progressively decreased, hemodynamic stability was maintained without need for transfusion, hemoglobin remained stable at 11.2 g/dL on day 2, and serum creatinine was unchanged.

A follow-up CT scan performed on day 7 showed marked regression of the subcapsular and perirenal hematoma, with no new extravasation or complication (Figures 3 and 4). The urinary catheter was removed on day 7. The patient was discharged on day 10 with the following recommendations: relative rest and restriction of physical activity for 6 weeks, abundant oral hydration, avoidance of nephrotoxic drugs, and close outpatient surveillance.

Figure 3*. Follow-up contrast-enhanced CT urography on day 7. Marked regression of the subcapsular and perirenal hematoma, with no new extravasation or complication.*

***Figure 4**. Follow-up contrast-enhanced CT urography on day 7 (additional view). Confirmation of progressive regression of the perirenal hematoma.*

At the 3-month follow-up visit, the patient was asymptomatic. Physical examination was unremarkable, blood pressure was 118/72 mm Hg, serum creatinine was stable at 89 µmol/L, and urine dipstick was negative. An annual nephrology follow-up program was instituted, including blood pressure measurement, serum creatinine with eGFR estimation, urine albumin-to-creatinine ratio, renal ultrasound, and dietary and preventive counseling.

Discussion

The kidney is the most frequently injured genitourinary organ during abdominal trauma, particularly under blunt mechanisms [1-3]. The mechanism observed in our patient illustrates a classical pattern of blunt renal trauma in rural settings, where animal-related and farm-work injuries account for a significant share of trauma admissions [4]. Worldwide, blunt mechanisms account for 80% to 90% of renal trauma in civilian series, whereas penetrating mechanisms predominate in armed-conflict and high-violence settings [4,5].

The reference framework for grading the severity of renal injury is the Organ Injury Scaling system of the AAST, originally published by Moore et al in 1989 [10], which categorizes injuries from grade I to grade V. A major revision was proposed in 2018 by Kozar et al to incorporate contemporary CT imaging features, particularly vascular injuries detected by CT [11,12]. This update offers improved prognostic value for the need for intervention. In our patient, the lesion was a parenchymal laceration deeper than 3 cm without involvement of the collecting system or urinary extravasation, corresponding to grade III. The absence of contrast extravasation was therefore decisive both for grading and for the therapeutic decision.

Contrast-enhanced CT is the imaging gold standard in stable patients with suspected renal trauma, with sensitivity approaching 95% to 98% for high-grade injuries [13,14]. In our patient, it also enabled the incidental discovery of contralateral renal agenesis, which fundamentally altered the therapeutic stakes.

Unilateral renal agenesis results from failure of metanephric blastema differentiation or defective induction by the ureteric bud during embryogenesis [7]. Its prevalence is estimated at 1 in 1,000 to 1 in 2,000 live births, with a male predominance [7,15]. It belongs to the spectrum of congenital anomalies of the kidney and urinary tract (CAKUT) and is frequently associated with ipsilateral genitourinary malformations. Patients with a solitary kidney exhibit, from intrauterine life, compensatory hypertrophy of the contralateral kidney and an increased single-nephron glomerular filtration rate—a state of glomerular hyperfiltration. Although most remain asymptomatic for decades, prospective cohort studies have shown that 20% to 30% develop signs of chronic kidney disease by the third or fourth decade of life [7,15,16]. This baseline vulnerability has direct implications for trauma management: every therapeutic choice should aim at maximal preservation of the renal parenchyma.

Over the past two decades, the management of renal trauma has undergone a paradigm shift, with progressive retreat from systematic surgical exploration in favor of selective nonoperative management, including for high-grade injuries. The guidelines of the European Association of Urology [5], the American Urological Association [17]. and the World Society of Emergency Surgery [4] converge on this position: conservative management is the rule in hemodynamically stable patients, regardless of AAST grade. Several large series and meta-analyses have demonstrated that nonoperative management yields a renal preservation rate exceeding 90% for grades I to III and 70% to 85% for grades IV to V, with lower transfusion requirements and shorter hospital stays, and with equivalent or better long-term renal function compared with early surgical exploration [18-20].

The cornerstone of conservative management is hemodynamic stability, defined in the guidelines as systolic blood pressure ≥ 90 mm Hg, heart rate < 100 beats/min, and absence of clinical signs of shock after appropriate initial resuscitation [5,17]. Eligible patients are admitted to a monitored unit with strict bed rest, regular vital-signs monitoring, repeated hemoglobin assessment, and clinical reassessment. Indications for transition from nonoperative to interventional or surgical management are persistent hemodynamic instability despite resuscitation, transfusion requirement greater than 4 units of packed red blood cells, an expanding perirenal hematoma, or a renal pedicle injury with persistent ischemia [4,5,17].

When intervention is necessary, selective or superselective angioembolization has emerged as the minimally invasive option of choice, particularly for active arterial bleeding, contained vascular injuries, and persistent hematuria [21,22]. It preserves functional parenchyma, has a technical success rate of 85% to 95%, and has substantially reduced the need for total nephrectomy in high-grade injuries. In patients with a solitary kidney, superselective embolization is the preferred salvage strategy when bleeding cannot be controlled, since it preserves the maximal amount of functional parenchyma [22]. Surgical exploration is now reserved for failures of conservative management and embolization, as well as for patients with hemodynamic instability not responding to resuscitation or with associated injuries requiring laparotomy [5,17]. When surgery is unavoidable, conservative surgical techniques such

as partial nephrectomy, renorrhaphy, and vascular repair must be prioritized over total nephrectomy whenever technically feasible, particularly in patients with a solitary kidney [5,23].

Shin et al reported the successful conservative management of an AAST grade IV injury in a patient with a solitary kidney, with recovery of renal function and avoidance of dialysis [24]. Karn et al described a post-traumatic urinoma on an anomalous solitary kidney, treated successfully with ureteral stenting [25]. These reports, in keeping with our own observation, confirm that the presence of a solitary kidney is not in itself a contraindication to conservative management; on the contrary, the imperative of renal preservation reinforces the need to avoid every nonessential surgical exploration.

In our patient, several elements supported the choice of conservative management: persistent hemodynamic stability without need for transfusion, AAST grade III injury, absence of associated abdominal injury, and rapid clinical improvement.

Long-term follow-up of patients with a solitary kidney after renal trauma raises specific concerns. Beyond the early complications already mentioned, the two principal long-term concerns are post-traumatic hypertension and progressive chronic kidney disease [26,27]. Post-traumatic hypertension may emerge from weeks to several years after the injury, in relation to ischemia of viable parenchyma, and its reported incidence ranges from 5% to 40% depending on injury grade and duration of follow-up [26]. Long-term renal deterioration is multifactorial, combining loss of functional parenchyma, the preexisting hyperfiltration of the solitary kidney, and any superimposed comorbidities. Long et al emphasized the need for structured long-term follow-up after renal trauma, particularly in patients with a solitary kidney [27].

On these grounds, our patient was enrolled in an annual nephrology follow-up program comprising blood pressure measurement, serum creatinine with eGFR estimation, urine albumin-to-creatinine ratio, lipid panel, and renal ultrasonography. Lifestyle counseling was delivered, emphasizing adequate hydration, blood pressure control, strict avoidance of nephrotoxic drugs (especially NSAIDs and aminoglycosides), and a normo-protein diet. The patient was also informed of the absolute need to seek medical attention promptly for any recurrence of lumbar pain, hematuria, or systemic symptoms.

The limitations of our observation are inherent to the case-report format, and a 3-month follow-up is insufficient to assess long-term renal function and the development of post-traumatic hypertension. We are committed to maintaining follow-up of this patient and plan to publish longer-term outcomes in a future communication.

Conclusions

Blunt renal trauma occurring on a congenital solitary kidney represents a rare but high-stakes clinical situation. Our observation illustrates that, in keeping with current guidelines, conservative management remains the treatment of choice in hemodynamically stable patients, regardless of AAST grade, including when the kidney is solitary. The therapeutic priority is preservation of renal function, which requires rigorous clinical monitoring, high-quality CT imaging, recourse to selective embolization when needed, and avoidance of every nonessential surgery. Structured long-term nephrology follow-up is mandatory in this population, given the cumulative risks of post-traumatic hypertension and progression to chronic kidney disease.

Author Contributions

- **M. Beye:** Conception, clinical management, manuscript drafting, critical revision, final approval; study guarantor.
- **B. Sakho:** Nephrology assessment, long-term follow-up plan, manuscript drafting, final approval.
- **S. M. A. Fall:** Imaging interpretation, critical revision, final approval.
- **B. Mbengue:** General-surgery assessment, exclusion of associated intra-abdominal injuries, supervision, critical revision, final approval.
- **T. M. Ndiaye:** Patient management, literature review, manuscript drafting, final approval.
- **D. I. G. Ba:** Vascular and thoracic assessment, exclusion of associated thoracic and vascular injuries, critical revision, final approval.

Conflicts of Interest

The authors declare no conflicts of interest related to this work.

Funding

This work received no specific funding from public, commercial, or not-for-profit sources.

Ethical Approval

This case report was conducted in accordance with the Declaration of Helsinki. Given the retrospective single-case nature of the report, formal Institutional Review Board approval was waived per institutional policy. Written informed consent for publication of clinical and imaging data was obtained from the patient.

Patient Consent

Written informed consent for publication was obtained from the patient. A copy of the consent form is held by the corresponding author and available to the editor on request.

Use of AI

No generative artificial-intelligence tool was used to generate, analyze, or interpret data. Language polishing was performed by the authors with the help of standard editing software; the authors take full responsibility for the accuracy and integrity of the manuscript content.

Acknowledgments

The authors thank the radiology and emergency medicine teams of Heinrich Lübke Regional Hospital for their collaboration in patient management.

Data Availability

De-identified clinical and imaging data underlying this case report are available from the corresponding author upon reasonable request.

References

1. Freton L, Pradere B, Fiard G, et al. Renal trauma. Prog Urol. 2019;29(15):936-942.
2. Voelzke BB, Leddy L. The epidemiology of renal trauma. Transl Androl Urol. 2014;3(2):143-149.
3. Wessells H, Suh D, Porter JR, et al. Renal injury and operative management in the United States: results of a population-based study. J Trauma. 2003;54(3):423-430.
4. Coccolini F, Moore EE, Kluger Y, et al. Kidney and uro-trauma:

WSES-AAST guidelines. World J Emerg Surg. 2019;14:54.
5. Kitrey ND, Campos-Juanatey F, Hallscheidt P, et al. EAU Guidelines on Urological Trauma. European Association of Urology; 2024. Accessed April 1, 2026. https://uroweb.org/guidelines/urological-trauma
6. Bryk DJ, Zhao LC. Guideline of guidelines: a review of urological trauma guidelines. BJU Int. 2016;117(2):226-234.
7. Westland R, Schreuder MF, van Goudoever JB, Sanna-Cherchi S, van Wijk JAE. Clinical implications of the solitary functioning kidney. Clin J Am Soc Nephrol. 2014;9(5):978-986.
8. Westland R, Schreuder MF, Ket JCF, van Wijk JAE. Unilateral renal agenesis: a systematic review on associated anomalies and renal injury. Nephrol Dial Transplant. 2013;28(7):1844-1855.
9. Riley DS, Barber MS, Kienle GS, et al. CARE guidelines for case reports: explanation and elaboration document. J Clin Epidemiol. 2017;89:218-235.
10. Moore EE, Shackford SR, Pachter HL, et al. Organ injury scaling: spleen, liver, and kidney. J Trauma. 1989;29(12):1664-1666.
11. Kozar RA, Crandall M, Shanmuganathan K, et al. Organ injury scaling 2018 update: spleen, liver, and kidney. J Trauma Acute Care Surg. 2018;85(6):1119-1122.
12. Buckley JC, McAninch JW. Revision of current American Association for the Surgery of Trauma renal injury grading system. J Trauma. 2011;70(1):35-37.
13. Park SJ, Kim JK, Kim KW, Cho KS. Multidetector CT findings of renal trauma. AJR Am J Roentgenol. 2006;187(2):541-547.
14. Federle MP, Brown TR, McAninch JW. Penetrating renal trauma: CT evaluation. J Comput Assist Tomogr. 1987;11(6):1026-1030.
15. Sanna-Cherchi S, Ravani P, Corbani V, et al. Renal outcome in patients with congenital anomalies of the kidney and urinary tract. Kidney Int. 2009;76(5):528-533.
16. La Scola C, Ammenti A, Bertulli C, et al. Management of the congenital solitary kidney: consensus recommendations of the Italian Society of Pediatric Nephrology. Pediatr Nephrol. 2022;37(9):2185-2207.
17. Morey AF, Broghammer JA, Hollowell CMP, McKibben MJ, Souter L. Urotrauma guideline 2020: AUA guideline. J Urol. 2021;205(1):30-35.
18. Hampson LA, Radadia KD, Odisho AY, McAninch JW, Breyer BN. Conservative management of high-grade renal trauma. Curr Urol Rep. 2018;19(8):71.
19. McClung CD, Hotaling JM, Wang J, Wessells H, Voelzke BB. Contemporary trends in the immediate surgical management of renal trauma. J Urol. 2013;190(5):1742-1747.
20. Lanchon C, Fiard G, Arnoux V, et al. High grade blunt renal trauma: predictors of surgery and long-term outcomes of conservative management. A prospective single center study. J Urol. 2016;195(1):106-111.
21. Hotaling JM, Sorensen MD, Smith TG 3rd, Rivara FP, Wessells H, Voelzke BB. Analysis of diagnostic angiography and angioembolization in the acute management of renal trauma using a national data set. J Urol. 2011;185(4):1316-1320.
22. Stewart AF, Brewer ME Jr, Daley BJ, Klein FA, Kim ED. Intermediate-term follow-up of patients treated with percutaneous embolization for grade 5 blunt renal trauma. J Trauma. 2010;69(2):468-470.
23. Shoobridge JJ, Corcoran NM, Martin KA, Koukounaras J, Royce PL, Bultitude MF. Contemporary management of renal trauma. Rev Urol. 2011;13(2):65-72.
24. Shin H, Sung AJ, Lee MA, et al. Salvation of a solitary kidney in a patient with grade IV renal trauma: a case report. J Trauma Inj. 2022;35(suppl 1):S18-S22.
25. Karn M, Kandel D, Mahato BK, Thapa S, Kc HB. Urinoma following blunt renal trauma in a patient with anomalous solitary kidney: a case report. Int J Surg Case Rep. 2021;86:106386.
26. Watts RA, Hoffbrand BI. Hypertension following renal trauma. J Hum Hypertens. 1987;1(2):65-71.
27. Long JA, Savoie PH, Boissier R. Management of complications of upper urinary tract trauma (kidney and ureter). Prog Urol. 2021;31(15):1014-1021.