

Anticoagulation Over Revascularization: Managing Traumatic Renal Artery Thrombosis in an Adolescent Trauma Patient

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Abstract: ***Background:** Traumatic renal artery thrombosis (TRAT) is an uncommon but potentially severe vascular consequence of blunt abdominal trauma. Because early symptoms are often minimal, diagnosis is frequently delayed, and the appropriate management strategy—particularly the point at which antifibrinolytic therapy should give way to anticoagulation—remains a subject of ongoing debate. **Case Presentation:** A male adolescent presented twelve hours after a road traffic accident with left flank pain. His initial FAST scan was only minimally positive, his abdominal girth stayed stable on serial measurement, and a mild drop in haemoglobin settled on its own with tranexamic acid and immobilisation. It was only on contrast-enhanced CT that the true picture emerged: a non-enhancing left kidney with absent opacification of the left renal artery, confirming TRAT. Once the thrombosis was identified, tranexamic acid was stopped, and anticoagulation began on day two—first enoxaparin, then a transition to warfarin with aspirin. The patient stayed haemodynamically stable throughout, his renal function held up, and he was discharged in good condition. **Conclusion:** For hemodynamically stable, unilateral TRAT, conservative management with anticoagulation is a reasonable alternative to revascularisation. Antifibrinolytic therapy should be discontinued as soon as arterial thrombosis is confirmed, and clinicians should bear in mind that a thrombus can mask an underlying renal laceration—a real hazard if revascularisation is attempted.*

Keywords: Renal Artery Obstruction; Blunt Trauma abdomen, Nonpenetrating; Tranexamic Acid; Anticoagulants; Adolescent; Renal artery thrombosis

1. Background

Renal trauma accounts for roughly 1–5% of all trauma admissions worldwide, and blunt mechanisms—chiefly road-traffic accidents and falls—are responsible for the large majority, around 80–90% of cases. Within this group, high-grade injuries (AAST Grade IV–V) make up an estimated 20–25% of renal trauma in large registry-based series, though Grade V injuries on their own account for only about 5–7%.

Renal artery injuries represent a much smaller slice of this picture. The National Trauma Data Bank recorded just 517 renal artery injuries among 945,326 blunt trauma patients—roughly 0.05%. Traumatic renal artery thrombosis is rarer still, documented almost entirely through isolated case reports and small case series rather than any substantial cohort.

Table 1 places these figures side by side, to give a sense of just how uncommon the injury pattern discussed in this report actually is.

Table 1: Epidemiology of Renal Trauma, High-Grade Renal Injuries, and Renal Artery Thrombosis

Epidemiologic Parameter	Estimate / Incidence	Key Source(s)
Renal trauma among all trauma admissions	1–5% of all trauma cases	UpToDate; NCBI Bookshelf (Renal Trauma Overview)
Proportion due to blunt trauma	80–90%	NCBI Bookshelf; AAST series
High-grade (AAST IV–V) renal injuries among renal traumas	20–25%	Wessells et al., J Urol 2003; Santucci & McAninch, J Urol 2001
Grade V renal trauma alone	5–7%	Wessells et al.; trauma center studies
Renal artery injuries among all blunt trauma patients (NTDB)	0.05% (517/945,326 cases)	Sangthong et al., J Am Coll Surg 2006
Renal artery injuries among all renal traumas	<1%	NTDB; AAST reviews
Isolated renal artery injury (no associated organ injury)	~17% of renal artery injuries	NTDB registry
Traumatic renal artery thrombosis (TRAT) incidence	0.02–0.05% of blunt trauma patients	Garge et al., Haas et al., Ahmed et al.
Volume of reported TRAT cases worldwide	Primarily case reports / small case series (<1000 described overall)	Multiple reviews
Risk of post-traumatic renovascular hypertension	15–57%	Haas et al.; Lopera et al.

2. Case Presentation

A male adolescent presented to the emergency department twelve hours after being involved in a road traffic accident, with left flank and left abdominal pain as his primary complaint. He had no vomiting, no gross haematuria, and no loss of consciousness.

Initial Assessment

On arrival, his vital signs were stable and his airway and breathing were intact. There was no external bleeding, and peripheral pulses were strong. A FAST scan showed only a small amount of free fluid — minimally positive — and his abdominal girth, measured serially, remained unchanged over the observation period. Physical examination revealed localised tenderness in the left flank, without guarding or rigidity.

Laboratory Findings

Haemoglobin showed a mild initial drop but did not fall further. Creatinine and blood urea nitrogen were within normal limits, and urinalysis was negative for gross haematuria.

Initial Trauma Management

Following standard trauma protocol, the patient received tranexamic acid alongside immobilisation and close monitoring. His haemoglobin stabilised without requiring transfusion.

Investigations

Because his flank pain persisted and the mechanism of injury raised concern, a contrast-enhanced CT of the abdomen was performed. It showed a non-enhancing left kidney, absent opacification of the left renal artery, and mild perinephric fat stranding, with no obvious laceration or expanding haematoma. Taken together, these findings confirmed traumatic left renal artery thrombosis.

Differential Diagnosis

Before the CT findings settled the matter, the differential included traumatic renal artery thrombosis, renal artery dissection, high-grade renal contusion, segmental renal infarction, and renal vein thrombosis. The combination of global non-enhancement and arterial non-opacification on imaging was what ultimately established the diagnosis.

3. Treatment

Initial Trauma Therapy

Tranexamic acid was given early, in line with its established role as a first-line agent for preventing haemorrhage in trauma by stabilising clot formation and limiting fibrinolysis. Once renal artery thrombosis was discovered, however, continuing the drug risked promoting further, pathological clot propagation- so it was discontinued as soon as the diagnosis was confirmed.

Anticoagulation Strategy

On day two, once stable haemoglobin and the absence of expanding haemorrhage had been confirmed, systemic anticoagulation was started with enoxaparin, a low-molecular-weight heparin. This was later transitioned to

warfarin, with aspirin added for its antiplatelet effect. The patient was watched closely for bleeding throughout, and none occurred.

Rationale for Conservative Management

Several factors argued against attempting revascularisation in this case: the patient was haemodynamically stable, the injury was unilateral, there was no active bleeding or expanding haematoma, and renal function was preserved. The delay in diagnosis - twelve hours post-injury- also worked against the likely success of any revascularisation attempt. Perhaps most importantly, there was a real possibility of an occult renal laceration hidden beneath the thrombus, since the cessation of blood flow can mask an underlying injury that would only become apparent once perfusion was restored.

This last point deserves emphasis: restoring perfusion in the presence of a hidden renal laceration can trigger sudden haemorrhage, potentially forcing the surgeon's hand toward nephrectomy.

Outcome and Follow-up

The patient's haemoglobin remained stable, no further bleeding occurred, renal function stayed normal, and his blood pressure never rose. His pain resolved. Follow-up Doppler ultrasound at one and three months showed collateral perfusion developing to the left kidney, and he remained on warfarin with regular INR monitoring, his renal function holding steady throughout.

4. Discussion

TRAT is rare, and its subtle clinical presentation means it is often missed or diagnosed late. Contrast-enhanced CT is central to picking it up. Tranexamic acid undoubtedly saves lives in hemorrhagic trauma, but once arterial thrombosis has been identified, it needs to be stopped without delay- its antifibrinolytic action stabilises the thrombus and can worsen the occlusion it has caused.

Conservative management, and anticoagulation in particular, is gaining recognition as a viable approach to unilateral TRAT in patients who remain haemodynamically stable. The literature bears this out: revascularisation success rates are generally low, and even lower when presentation is delayed, as it was here. Restoring perfusion to a kidney harbouring an occult laceration carries real risk, since ischemia-driven clotting can initially conceal the injury, only for reperfusion to unmask it and precipitate haemorrhage.

Anticoagulation, introduced once antifibrinolytic therapy has been withdrawn, therefore offers a safer path forward in carefully selected patients.

Long-term follow-up remains essential, since renovascular hypertension, renal atrophy, and chronic kidney dysfunction can all emerge later. None of these complications developed in our patient over the follow-up period.

5. Learning Points

- Traumatic renal artery thrombosis is a rare but important diagnosis to consider in blunt abdominal trauma.

- Contrast-enhanced CT is essential for accurate vascular assessment.
- Tranexamic acid is appropriate early in trauma management but should be stopped once thrombosis is confirmed.
- Conservative management with anticoagulation can be effective in hemodynamically stable unilateral injuries.
- Revascularisation may fail, or provoke hemorrhage, in cases where an occult renal laceration is masked by the initial thrombus.
- Long-term follow-up is necessary to detect renal and vascular complications.

Author Contributions

Geetika Anand was responsible for case documentation, literature review, and drafting of the manuscript, and served as corresponding author. Manoj Sonkar was responsible for the patient's clinical management, including imaging review and oversight of treatment decisions, and provided critical revision of the manuscript. Udit Patel and Prena Minz reviewed and edited the manuscript draft prior to submission. All authors read and approved the final manuscript.

Declarations

Consent: Written informed consent for publication of this case, including clinical details and imaging findings, was obtained from the patient / legal guardian. [Confirm and retain documentation per IJSR requirements before submission.]

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References

- [1] Sangthong B, et al. J Am Coll Surg. 2006.
- [2] Garge S, et al. Ulus Travma Acil Cerrahi Derg. 2013.
- [3] Tsai SH, et al. Int J Clin Pract. 2007.
- [4] Haas CA, et al. J Trauma. 1998.
- [5] Jawas A, Abu-Zidan FM. Int J Surg. 2008.
- [6] Heldenberg E, Bass A. Isr Med Assoc J. 2013.
- [7] Lopera JE, et al. J Vasc Interv Radiol. 2011.
- [8] Nakayama T, et al. Int J Urol. 2006.

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