

# Early Diagnosis of Blunt Renal Artery Injury and Endovascular Treatment

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**B**lunt renal artery injury is a relatively rare finding. The literature demonstrates an incidence as low as 0.08% of all blunt abdominal traumas, occurring in 1% to 4% of patients with renal injury [1]. In this report we describe an approach to revascularization that resulted in the successful salvage of renal function after blunt trauma.

## PATIENT DESCRIPTION

A 20 year old man was hospitalized after falling from a motorcycle and

landing on his right side. On admission his blood pressure was 180/90 mmHg. Physical examination revealed mild tenderness over the right abdomen. Serum creatinine was 103 mmol/L (normal 62-115). Focused assessment sonography for trauma showed a small amount of fluid in Morison's pouch. The patient also had a right tibial plato fracture.

A contrast-enhanced computed tomography scan demonstrated a grade II liver tear without extravasation of contrast material, and a small amount of blood around the liver. The right kidney had no homogenous blood supply but a trace of fluid was seen within Gerota's fascia. The intimal flap was observed in the right renal artery during the arterial phase of the CT scan [Figure A]. Perfusion of the right kidney was delayed and there was no excretion

of contrast from the right kidney on delayed images. Renal angiography confirmed a localized intimal dissection in the middle of the main renal artery 5 mm from the bifurcation. The intimal flap traversed the whole lumen but still allowed passage of contrast.

The case was reviewed with a vascular surgeon who agreed to attempt endovascular repair. Endovascular access was obtained using a right transfemoral approach. The dissection was carefully crossed with a 0.035 inch hydrophilic guidewire (Radiofocus, Terumo, Japan). A 7 x 20 mm balloon-expandable stent (AVE Bridge, Medtronic, USA) was then placed across the dissection. Post-stenting films showed a uni-luminal renal artery with a smooth intimal surface and good flow across the stented segment [Figure B]. Heparin, 1000 units, was administered during the procedure.

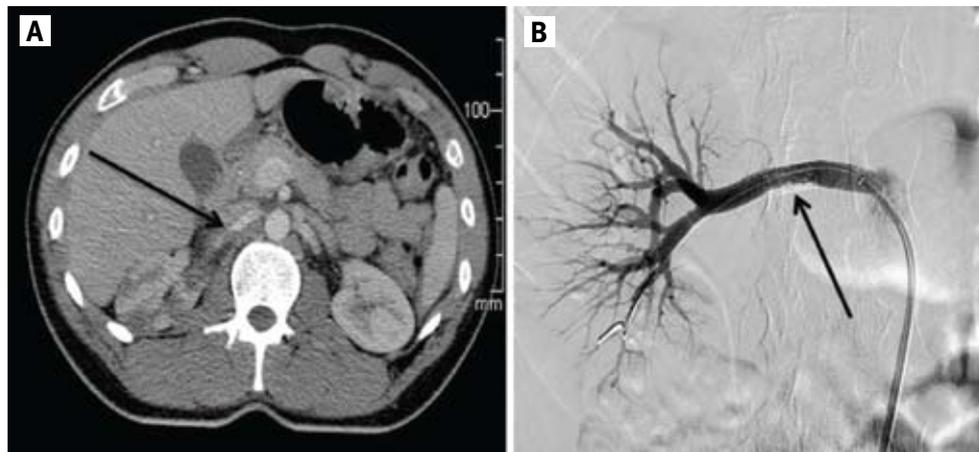
The time from injury to stent placement was 3 hours. Blood pressure was high on the first 2 days (180/100 mmHg) and then slowly decreased to 135/80 mmHg. No antihypertensive medications were given. Serum creatinine on day 2 was 73 mmol/L. The patient was discharged on acetylsalicylic acid 375 mg daily for 3 months.

Doppler ultrasound of the right renal artery one week after stenting of the renal artery showed normal flow through the stented segment. Renal scintigraphy using 99mTc-labeled DMSA scan demonstrated differential renal function, i.e., 41% of the total renal function.

At 10 months follow-up, the patient was not taking antihypertensive medica-

**[A]** Dynamic helical CT reveals numerous irregular hypodensities scattered throughout the right renal parenchyma. This appearance can be mistaken for multiple lacerations or contusions. Contrast-enhanced abdominal CT scan in the arterial phase reveals an abrupt cutoff of contrast medium in the mid-portion of the right renal artery (arrow).

**[B]** Renal arteriogram after placement of an endovascular stent in the right renal artery (arrow).



tions. Blood pressure was 130/80 mmHg and serum creatinine was normal. A renal scintigram showed that 42% of the total renal activity was supported by the affected right kidney.

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### COMMENT

Endovascular stenting of renal arteries has a limited role in the traumatically injured patient since maintaining stent patency requires anticoagulation, which is not always possible in the context of other bleeding sites. If detection of renal artery thrombosis is delayed, the kidney may be allowed to atrophy; delayed nephrectomy can be performed if hypertension develops [2]. Once a renal artery injury has been established, surgical revascularization has historically been the treatment of choice, but its success has been limited. Surgical exploration has been associated with mortality rates of 9–20% because of concomitant injury to other organ systems [1]. The results of successful renal salvage following surgical repair are also disappointing, ranging from 20% to 30% in most large series [3].

CT scan is the preferred imaging modality for identifying renal parenchymal injury in a stable trauma patient. While tears of the renal parenchyma and surrounding perirenal hematomas are diagnosed without difficulty on CT, diminished contrast uptake is often subtle and can easily be altered in light of other solid organ injury. In our case, CT clearly depicted decreased enhancement of the right kidney. The delayed pictures must be performed to identify any possible collecting system injury.

Renal artery stent placement is a well-established technique for the elective treatment of atherosclerotic vascular disease [4]. Renal artery stenting in the trauma setting has been described in a collection of case reports [5]; there were no reported complications related to the procedure and renal function was preserved in all reviewed cases. The long-term success of endovascular stenting in the management of blunt renal artery injury has not been previously documented. The longest follow-up period in the literature is 4 years [5].

Given the poor success rate of surgical revascularization, we believe that

stenting of the renal artery offered the best chance for maximal preservation of renal function in our patient. Percutaneous revascularization can be considered in hemodynamically stable patients who do not undergo immediate laparotomy and who can tolerate moderate antiplatelet medication.

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