

Case Report

The rare event of exercise-induced dissection of the renal artery: successful long-term treatment by localized lysis

Gerald S. Braun¹, Ulrich Linsenmaier², Matthias N. Witt³ and Holger Schmid³

¹Department of Nephrology and Immunology, Technical University of Aachen (RWTH), 52057 Aachen, ²Department of Radiology and ³Department of Nephrology, Medical Policlinic, University of Munich (LMU), 80336 Munich, Germany

Keywords: kidney infarction; rt-PA; spontaneous dissection; sports

Case report

A previously healthy 31-year-old man experienced a sudden onset of severe left loin pain radiating into the left lower abdomen during a side-movement, while performing a workout of the abdominal muscles in a fitness club. He collapsed and was immediately brought to our emergency department. Vital signs were blood pressure 130/75 mmHg, heart rate 64/min, height 185 cm and weight 85 kg. The clinical examination was unremarkable. Relevant laboratory parameters were a serum creatinine of 1.2 mg/dL, blood-urea nitrogen of 15 mg/dL, creatinine kinase of 24 IU/L (25°C) and a normal urinalysis. Abdominal CT revealed the absence of perfusion of the lower and middle pole of the left kidney, corresponding to an 80% perfusion deficit (Figure 1A). Subsequent angiography demonstrated a dissection and thrombotic occlusion of the left renal artery (Figure 1B). Multi-step local lysis was performed within 6 h and on the following day, using 7 mg of recombinant tissue-plasminogen activator (rt-PA), respectively. As estimated by final angiography, perfusion could be essentially restored (Figure 1C). On Day 2, LDH rose to 1950 U/L (25°C), demonstrating tissue damage, and serum creatinine was 1.5 mg/dL but reached a steady state at 1.3 mg/dL during the next days. Subsequently, blood pressure remained normal and the patient was discharged on oral phenprocoumon for 6 months without antihypertensive medication. At 6-month follow-up, blood pressure was 110/75 mmHg, serum creatinine was 1.0 mg/dl and creatinine clearance was 95 mL/min. Doppler ultrasonography showed a renal arterial resistive-index of 0.6 bilaterally, indicating the absence of re-occlusion or re-stenosis. The lysed kidney had shrunk by 2 cm in length but ~50% of its function was

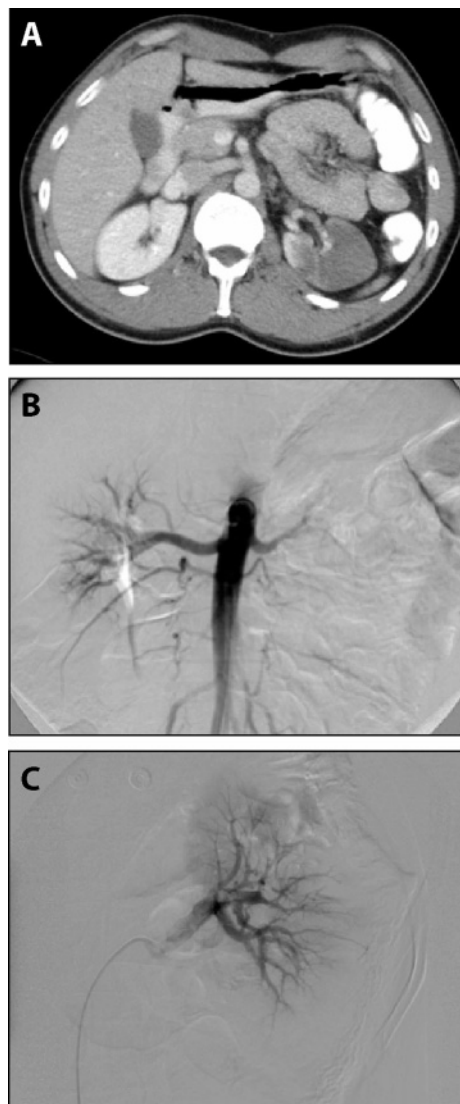


Fig. 1. (A) Contrast-enhanced abdominal CT during the late venous phase showing a perfusion deficit of the middle and lower pole of the left kidney. (B) Digital subtraction angiography (DSA) showing a corresponding perfusion deficit of the left kidney during the early filling phase. (C) Good reperfusion after the second cycle of local lysis with rt-PA.

Correspondence and offprint requests to: Holger Schmid, Department of Nephrology, Medical Policlinic, University of Munich (LMU), Pettenkoferstrasse 8a, 80336 Munich, Germany. Tel: +49-89-51603511; Fax: +49-89-51604924; E-mail: holger.schmid@lrz.uni-muenchen.de

preserved, as demonstrated by scintigraphic excretory testing (73% on the right, 27% on the left kidney). At 5-year follow-up, blood pressure was 125/75 mmHg, serum creatinine was 1.1 mg/dl and creatinine clearance was 131 mL/min. Renal ultrasound and Doppler sonography showed an unchanged situation.

Discussion

Renal artery dissection is a rare event that is usually caused by blunt trauma or occurs in association with predisposing conditions such as atherosclerosis, fibromuscular dysplasia, genetic connective tissue disease, syphilis, tuberculosis and cocaine or amphetamine consumption [1–3]. On the other hand, sports or physical exercise leading to renal artery dissection has been described four times in the literature, i.e. with aerobics [4], sit-ups for abdominal muscle training [3], triathlon [2] and rope skipping [1]. The presumed mechanism is intimal tearing, by either direct stretching of the artery by movement through muscular tension or by forces of acceleration/deceleration [2]. In these cases and the present one, no predisposing condition was identified. A continuum of a mechanism of acceleration/deceleration where sport is on one side and trauma is at the other extreme is stressed by two cases where dissection was associated with a jump from a truck and aerobic flight manoeuvres involving high *G*-acceleration, respectively [2,5]. In the setting of an infarcted kidney, arterial hypertension does not usually develop immediately, but takes months to years to develop [3,6]. Eventually, the decision for removal of a damaged kidney is made [2,6].

Localized lysis has a pre-emptive character by aiming to reverse the occlusion immediately. Ideally it should be performed within the first hour. As demonstrated in the literature and by the case presented herein, a lasting partial function of the affected kidney can potentially be restored, and development of arterial hypertension can be prevented after 5 years of follow-up [7]. In the future, as more results of long-term observations of treated patients become available, the general usefulness of this promising approach may be better estimated.

Conflict of interest statement. None declared.

References

1. Tovbin D, Lantsberg S, Feldman L *et al.* Unilateral acute renal cortical necrosis (ACN) following skipping with a rope. *Nephrol Dial Transplant* 2000; 15: 415–418
2. Thomas MC, Walker RJ, Packer S. Running repairs: renal artery dissection following extreme exertion. *Nephrol Dial Transplant* 1999; 14: 1258–1259
3. Alamir A, Middendorf DF, Baker P *et al.* Renal artery dissection causing renal infarction in otherwise healthy men. *Am J Kidney Dis* 1997; 30: 851–855
4. Montgomery JH, Moinuddin M, Buchignani JS *et al.* Renal infarction after aerobics. *Clin Nucl Med* 1984; 9: 664–665
5. Beyer RW, Daily PO. Renal artery dissection associated with *Gz* acceleration. *Aviat Space Environ Med* 2004; 75: 284–287
6. Meyrier A, Rainfray M, Lacombe M. Delayed hypertension after blunt renal trauma. *Am J Nephrol* 1988; 8: 108–111
7. Klein RM, Niehues R, Hollenbeck M *et al.* The local lysis therapy of spontaneous renal artery dissection with arterial thrombosis. *Dtsch Med Wochenschr* 1992; 117: 1185–1190

Received for publication: 4.12.07

Accepted in revised form: 6.12.07