

retention, and angiography can be valuable for diagnosis and treatment in suspicious cases, even though angiography is highly invasive compared to ultrasonography and CT.

Absolute ethanol was used for embolization in both patients according to the surgeon's experience and preference. Although absolute ethanol is effective in the treatment of AVMs and results in a low rate of recurrence, serious complications and recurrence can occur, so careful follow-up is essential.^{9,10} One report mentioned that complete obliteration of type III shunts can be obtained with NBCA by following some key points: use a relatively low concentration of NBCA (20%–33%), control flow of all feeding arteries by balloon occlusion of the renal arterial stem, administer a slow and prolonged injection, and wedge the catheter tip deeply into the proper feeding artery.¹

Author contributions

Makoto Ishii contributed to acquisition of subjects and/or data, data analysis, interpretation, and preparation of manuscript. Wataru Nakata contributed to study concept and design, acquisition of subjects and/or data, data analysis and interpretation, and critical review of the manuscript. Yuki Horibe, Go Tsujimura, Yuichi Tsujimoto, Mikio Nin, and Masao Tsujihata contributed to acquisition of subjects and/or data.

Conflict of interest

The authors declare no conflict of interest.

Approval of the research protocol by an institutional reviewer board

This study was approved by the Ethics Committee of Osaka Rosai Hospital (approval number: 2020-137).

Editorial Comment

Editorial Comment from Dr. Kato to Recurrent urinary retention due to clots caused by a congenital renal arteriovenous malformation that forms a complex vascular network: Report of two cases

Renal arteriovenous malformations (AVMs) are a rare disease that is characterized by anastomotic and abnormal communications between renal arterial and venous systems.¹ Among them, congenital renal AVMs are rare renal vascular abnormalities which is present in approximately 20% of all renal AVM cases with a prevalence of 0.04% in general population and usually remain asymptomatic until the age of 30 or 40.² These are a rare but sometimes fatal cause of hematuria because about

Informed consent

Informed consent was obtained from the patients included in this study.

Registry and the registration no. of the study/trial

Not applicable.

References

- 1 Maruno M, Kiyosue H, Tanoue S *et al.* Renal arteriovenous shunts: clinical features, imaging appearance, and transcatheter embolization based on angioarchitecture. *Radiographics* 2016; **36**: 580–95.
- 2 Takaha M, Matsumoto A, Ochi K, Takeuchi M, Takemoto M, Sonoda T. Intrarenal arteriovenous malformation. *J. Urol.* 1980; **124**: 315–8.
- 3 Javanmard B, Haghighat Khah H, Fallah-Karkan M, Khan S. Recurrent hematuria in renal angio-venous malformation, delay diagnosis and endovascular treatment, a case report. *Urol. Case Rep.* 2018; **16**: 46–7.
- 4 Hatzidakis A, Rossi M, Mamoulakis C *et al.* Management of renal arteriovenous malformations: a pictorial review. *Insights Imaging.* 2014; **5**: 523–30.
- 5 Dames EL, Ng LG, Tay KH. Congenital renal arteriovenous malformation presenting with gross hematuria after a routine jog: a case report. *J. Med. Case Rep.* 2014; **8**: 65.
- 6 Ali M, Aziz W, Abbas F. Renal arteriovenous malformation: an unusual cause of recurrent hematuria. *BMJ Case Rep.* 2013; **10**: bcr2013010374.
- 7 Cura M, Elmerhi F, Suri R, Bugnone A, Dalsaso T. Vascular malformations and arteriovenous fistulas of the kidney. *Acta Radiol.* 2010; **51**(2): 144–9.
- 8 Isom N, Masoomi R, Alli A, Gupta K. Congenital renal arteriovenous malformation: a rare but treatable cause of hypertension. *Am. J. Case Rep.* 2019; **20**: 314–7.
- 9 Yakes WF, Rossi P, Odink H. How I do it. Arteriovenous malformation management. *Cardiovasc. Intervent. Radiol.* 1996; **19**(2): 65–71.
- 10 Mitchell SE, Shah AM, Schwengel D. Pulmonary artery pressure changes during ethanol embolization procedures to treat vascular malformations: can cardiovascular collapse be predicted? *J. Vasc. Interv. Radiol.* 2006; **17**: 253–62.


30% of patients may present with signs of congestive heart failure from high-output fistulas, and up to 50% with cardiomegaly and hypertension.³ So far, congenital AVMs are subdivided into three categories; type I, a single or few arteries (<4) shunt into a single draining vein; type II, multiple arterioles shunt into a single draining vein; and type III, multiple shunts are present between the arterioles and venules that form a complex vascular network.⁴ Especially, type III renal AVMs pose a diagnostic challenge in clinical settings.

In the present study, Ishii *et al.* reported two renal congenital renal AVM cases that were adequately diagnosed by renal angiography.⁵ Importantly, a contrast enhanced computed tomography was not enough to make a diagnosis of these AVM cases since type III AVMs consists of an arteriovenous fistula with a complex vascular network in a small branch of

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renal artery. In addition, type III AVMs are difficult to be diagnosed with ultrasonography because an arteriovenous fistula normally forms complex and abnormal vascular networks. Considering these features, although the study contained the limitation of a small number of cases, we physicians need to consider that type III AVMs can be one of the causes for persisting hematuria that is not diagnosed by several types of examination.

To promote better understanding of renal AVMs, future studies should investigate the recurrence rate of arteriovenous fistula after angiographic embolization. In addition, it is necessary to develop a new diagnostic method for patients with impaired renal function (e.g., magnetic resonance angiography) since contrast agent is hard to use in these patients.

Taigo Kato M.D., Ph.D. 

Department of Urology, Osaka University Graduate School
of Medicine, Osaka, Japan
kato@uro.med.osaka-u.ac.jp

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References

- 1 Cura M, Elmerhi F, Suri R, Bugnone A, Dalsaso T. Vascular malformations and arteriovenous fistulas of the kidney. *Acta Radiol.* 2010; **51**: 144–9.
- 2 Sountoulides P, Zachos I, Paschalidis K *et al.* Massive hematuria due to a congenital renal arteriovenous malformation mimicking a renal pelvis tumor: a case report. *J. Med. Case Rep.* 2008; **2**: 144.
- 3 Chimpiri AR, Natarajan B. Renal vascular lesions: diagnosis and endovascular management. *Semin. Intervent. Radiol.* 2009; **26**: 253–61.
- 4 Maruno M, Kiyosue H, Tanoue S *et al.* Renal arteriovenous shunts: clinical features, imaging appearance, and transcatheter embolization based on angioarchitecture. *Radiographics* 2016; **36**: 580–95.
- 5 Ishii MNW, Horibe Y, Tsujimura G *et al.* Recurrent urinary retention due to clots caused by a congenital renal arteriovenous malformation that forms a complex vascular network: Report of two cases. *IJU Case Rep.* 2022; **5**: 5–8.