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Kidney autotransplantation for multiple renal artery aneurysms: A case report

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Abstract. *Kidney artery aneurysms are a rare phenomenon with a prevalence of 0.01%-1% in the general population. Although historical series describe rupture rates of 14% to 30% with a mortality rate of 80%, the natural history of kidney artery aneurysms is currently characterized by a low risk of rupture and a slow to nonexistent growth rate. Criteria for repair have been controversial for decades and currently include aneurysm size > 2 cm, female sex, and symptoms such as drug-refractory hypertension, pain, and hematuria. In this article, we report a successful kidney autotransplantation for multiple renal artery aneurysms (8 to 9 mm) in a 37-year-old woman who had suffered from arterial hypertension for 19 years. The clinical case described demonstrates the efficacy of surgical treatment of renal artery aneurysms with malignant hypertension.*

Keywords: kidney autotransplantation, renal artery aneurysms, arterial hypertension.

Conflict of interest. *The authors declare no conflict of interest.*

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Аутоотрансплантація нирки у пацієнтки з множинними аневризмами ниркових артерій: клінічний випадок

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Резюме. Аневризми ниркових артерій є рідкісним явищем із поширеністю 0,01%-1% серед загальної популяції. Хоча історичні дані описують рівень розривів аневризм ниркової артерій від 14% до 30% з рівнем смертності 80%, в даний час їх природний перебіг характеризується низьким ризиком розриву та повільним або зовсім відсутнім темпом росту. Критерії хірургічного лікування аневризм ниркових артерій були суперечливими протягом десятиліть і наразі включають розмір аневризми > 2 см, жіночу стать і такі симптоми, як медикаментозно-резистентна гіпертензія, біль і гематурія. У цій статті ми повідомляємо про успішну аутоотрансплантацію нирки з приводу множинних аневризм ниркових артерій у 37-річної жінки, яка протягом 19 років страждала на артеріальну гіпертензію. Описаний клінічний випадок свідчить про ефективність хірургічного лікування аневризм ниркової артерії у пацієнтів зі злоякісною гіпертензією.

Ключові слова: аутоотрансплантація нирки, аневризми ниркової артерії.

Background. Kidney artery aneurysms are a rare phenomenon with a prevalence of 0.01%-1% in the general population [1]. The location of the aneurysm can be classified as extraparenchymatous or intraparenchymatous. They may be fusiform or saccular in appearance and are extraparenchymatous in 90% of cases [2]. Although historical series describe rupture rates of 14% to 30% with a mortality rate of 80%, the natural history of kidney artery aneurysms is currently characterized by a low risk of rupture and a slow to nonexistent growth rate. Criteria for repair have been controversial for decades and currently include aneurysm size > 2 cm, female sex, and symptoms such as drug-refractory hypertension, pain, and hematuria [3]. The small size of the aneurysm (1 cm) at the time of rupture and the high historical maternal and fetal

mortality rates of approximately 56% to 92% and 82% to 100%, respectively, argue for more aggressive treatment of renal artery aneurysms in women of child-bearing age [4, 5].

Case report. A 37-year-old woman has been suffering from arterial hypertension for 19 years. Maximum blood pressure was BP 180/90 mmHg) and combined antihypertensive therapy was ineffective. Routine laboratory data were within reference values, and the glomerular filtration rate was 105 mL/min/1.73 m². In October 2020, computed tomography angiography (CTA) showed changes in the right kidney artery: 2 extraparenchymal saccular aneurysms (8 mm and 9 mm) and an intraparenchymal fusiform aneurysm with a high risk of rupture of 8 mm and proximal stenosis of the artery of 80% (Fig. 1).

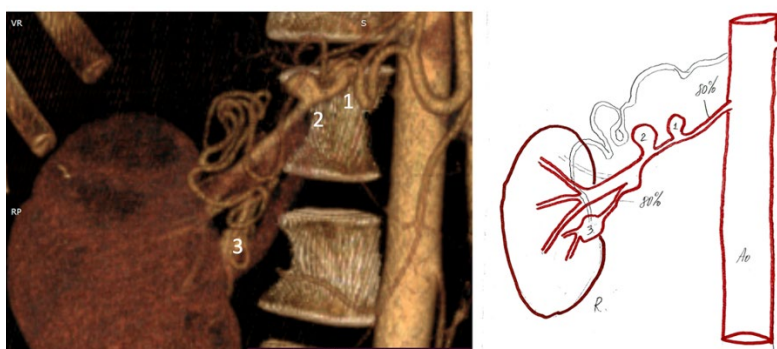


Figure 1. CTA before surgery and scheme of kidney artery aneurysms.

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Renal scintigraphy: right kidney is omitted, and size is reduced. Separate glomerular filtration in the right kidney is reduced by 51%. A control CTA was performed in December 2020, showing growth of both extraparenchymal aneurysms to +0.1 mm and +0.2 mm

and an increase in proximal stenosis to 90%. In February 2021, a series of operations were performed: right nephrectomy, extracorporeal renal artery reconstruction, and heterotopic renal autotransplantation. The

kidney was preserved ex vivo with the Custodiol solution. The extraparenchymal aneurysms were completely resected, and the intraparenchymal aneurysm was sutured with 8-0 polypropylene (Fig. 2).

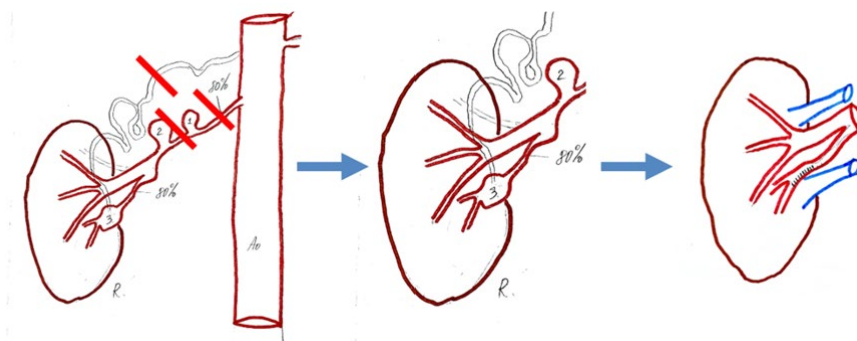


Fig. 2. Schematic diagram of the operation.

The right kidney was transferred to the left pelvic region. The renal artery was anastomosed to the iliac artery, and the left renal vein was anastomosed to the left iliac vein. The total ischemia time was 75 minutes. The autograft was homogeneously reperfused, and urine output began immediately.

Postoperatively, mean arterial blood pressure and blood test results remained within target values. Histopathologically, fibromuscular dysplasia of the extraparenchymal kidney artery aneurysms with thrombosis of one of them and the intrarenal artery was found without pathological changes. CTA and histopathologic findings 2 months after surgery are shown in Fig. 3.

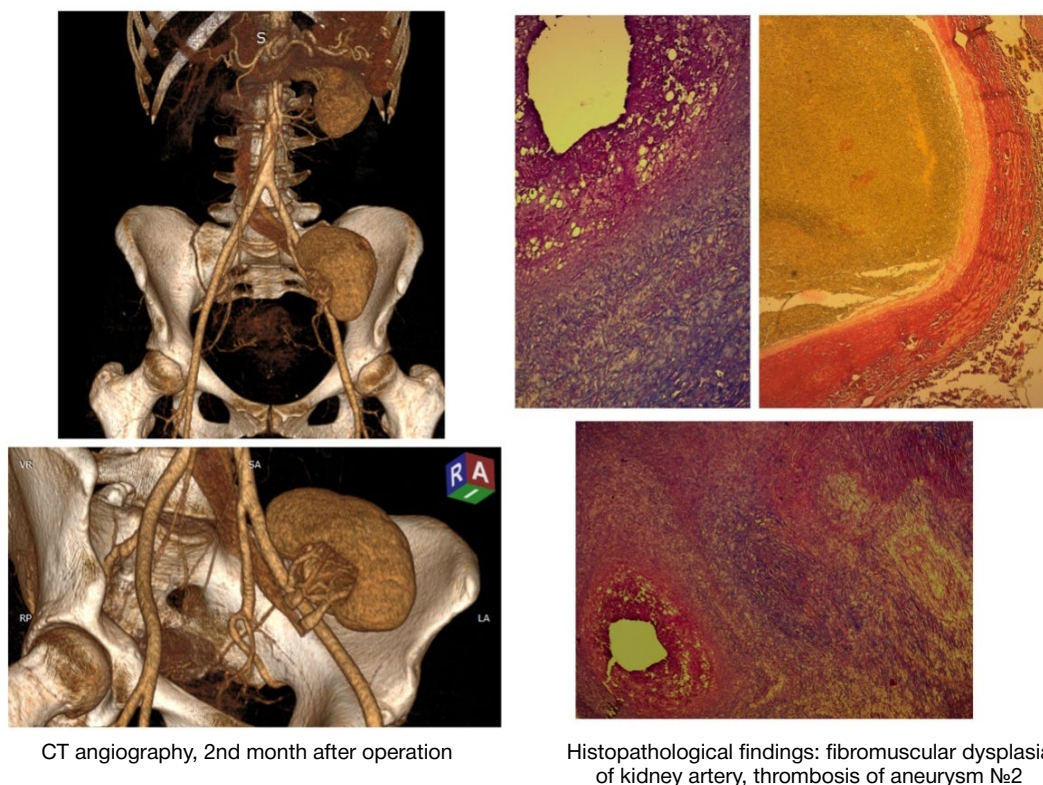


Fig. 3. CTA and histopathological findings of the patient.

In the late postoperative period, the glomerular filtration rate and ultrasonography of the renal autograft were monitored. The performed extracorporeal arterial reconstruction with renal autograft resulted in the normalization of renal hemodynamics and blood pressure during the 23-month follow-up period.

Discussion. According to the literature, only 22% of all visceral aneurysms are renal and they are typically solitary and unilateral [6]. Fibromuscular dysplasia is a non-atherosclerotic, non-inflammatory vascular disease that can lead to arterial stenosis, occlusion, aneurysm, or dissection [7]. In the present case, the patient

suffered from renovascular hypertension secondary to fibromuscular hyperplasia of the kidney artery with aneurysm formation, one of which was located at the hilum of the kidney (intraparenchymal). Endovascular treatment of kidney artery aneurysms can be the first option because of the advantages of minimal invasiveness, especially for simple aneurysms on the main artery, the first branch, or parenchymatous renal artery aneurysms [8]. However, considering the individual risks of low efficiency of endovascular treatment, extracorporeal renal artery reconstruction and renal autograft should be used [9, 10].

Conclusion. The clinical case described above demonstrates the efficacy of surgical treatment of kidney artery aneurysms with malignant hypertension.

Ethical approval, and consent to publish. The study was conducted according to the principles of the Declaration of Helsinki. Informed consent was obtained from the patient before publication.

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The authors' contribution.

A. Nykonenko: contributed to the study design, preparation of the manuscript, and final editing;

S. Vildanov: data analysis and interpretation, and writing parts of the paper;

V. Gubka and I. Rusanov: critical review of the manuscript;

R. Budaghov: obtaining data and writing parts of the paper.

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