

## CASE STUDY

## TWO CASES OF THE CALCIFIED RENAL ARTERY ANEURYSM. DIFFERENTIAL DIAGNOSIS AND TREATMENT (OWN EXPERIENCE)

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**ABSTRACT**

Renal artery aneurysm is defined as the dilated segment of renal artery exceeding twice the diameter of the normal renal artery. As more than half of such aneurysms have the annular calcification, they must be differentiated from the stones. Differential diagnosis of the renal artery aneurysm includes the parapelvic cysts, hydronephrosis and kidney tumors. Renal artery aneurysm can be diagnosed by CT, MRI, as well by ultrasonography and color dopplerography. Unfortunately presence of calcification renders the ultrasonographic examination impossible. In this article we share our own experience of two cases of calcified renal aneurysms diagnosed and treated at our hospital.

**KEY WORDS:** renal artery aneurysm, lithotripsy, urography, ultrasonography, dopplerography, nephrectomy

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**CLINICAL CASE**

Renal artery aneurysm (RAA) is defined as the dilated segment of renal artery exceeding twice the diameter of the normal renal artery [1]. According to the autopsy data, incidence of the true renal artery aneurysm is 1 case per 8 000–10 000 autopsies [2, 3]; however the recent results are higher (9,7%) [4]. According to the results of angiography, the incidence of RAA in the general population is 0.3–0.7% [5, 6, 7]; but higher in the patients with hypertension and fibromuscular dysplasia (2.5% and 9.2% respectively) [8, 9]. The most common cause of true RAA (the wall contains all the three layers) is fibromuscular dysplasia and atherosclerosis, whereas the most common etiology of the false aneurysms (the wall doesn't contain the three layers) is iatrogenic trauma and infection. The true RAA are usually located in the main trunk of the renal artery or at its bifurcation, at the same time the false ones dominate in the intrarenal arteries. Size of the aneurysm ranges from the several mm up to 8 cm, the mean diameter is 2.1 cm [10]. Calcified RAA is visible on the KUB in 27–50% cases and can be misdiagnosed as a kidney stone [3, 11, 12].

Diagnosis of RAA can be confirmed or at least suspected by intravenous urography in 66% cases, by the angiography in 100% cases [13]. On the intravenous urography the most common sign is the filling defect or compression of the collecting system, delayed function and asymmetric nephrograms, but the single sign on the KUB can be the annular calcification.

As more than half of RAA have the annular calcification, they must be differentiated from the stones. It's especially important if a lithotripsy has been planned [14]. Sensitivity and specificity to differentiate the vascular lesion and stone of MRI is 78% and 100% respectively, the MRI allows to

diagnose the malformation resembling the aneurysm in 91% cases [15].

RAA can be diagnosed by ultrasonography and color dopplerography as well. Calcified RAA looks like the crescent hyperechogenic lesion with the distal hyperechogenic shadow. On the ultrasonography the RAA looks like the hydrogenic mass lesion, containing the turbulent blood flow according to the color dopplerography. Unfortunately presence of calcification renders the ultrasonographic examination impossible. Differential diagnosis of the RAA includes the parapelvic cysts, hydronephrosis and kidney tumors [13, 16, 14, 17].

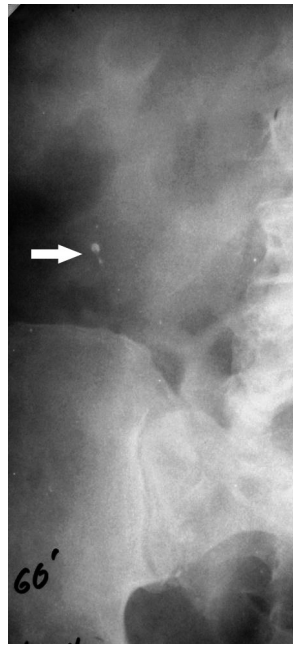
The urologist must always keep in mind the differential diagnosis between the stone and quite rare calcified aneurysm in order to avoid the major bleeding during the future operation. In this article we want to share our own experience of calcified renal aneurysms diagnosed and treated at our hospital.

**Case Report №1.** The patient (age 58) was urgently admitted to our hospital with the right-sided renal colic. According to the USG and KUB the patient had the stone (2 cm) of the renal pelvis with hydronephrosis. According to the results of CT we diagnosed the aneurism of the renal artery near the bifurcation causing the hydronephrosis. After the nephrectomy the patient was discharged home. Fig. 1 - 5.

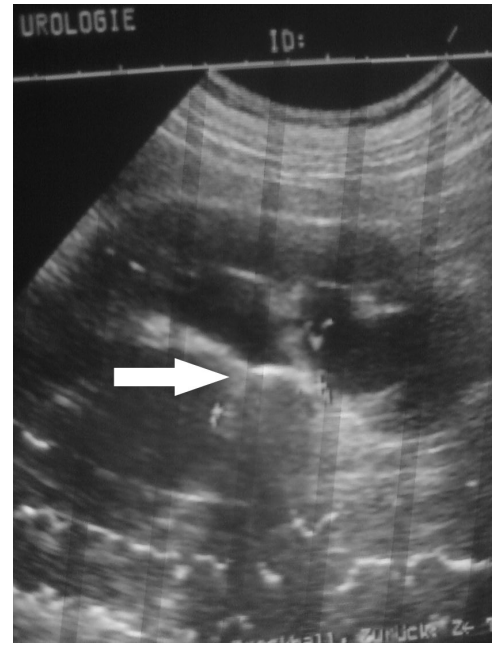
**Case Report №2.** The woman (age 62) with concomitant arterial hypertension was complaining about the pain in the right back and was sent to the Urological Department with the diagnosis: stone 2 cm of the right kidney established by USG. According to KUB the shadow of stone was situated in the projection of kidney but outside the collecting system.



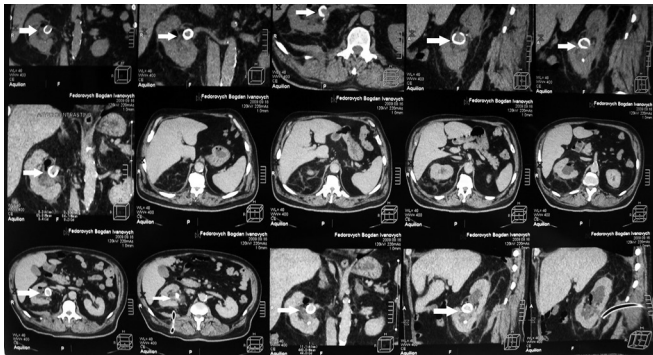
**Fig. 1.** KUB urography. Radioopaque annular shadow (arrow) in the projection of right kidney.



**Fig. 2.** IVU, 60 min. Contrasted urine is in the bladder. Excretory function of the right kidney is decreased. Radioopaque annular shadow (arrow) is situated in the projection of right kidney.



**Fig. 3.** Ultrasonography: hyperechoic lesion (arrow) with the acoustic shadow resembling the stone in the projection of pelvis of the right kidney, obstructing the pelvis and causing the hydronephrosis.

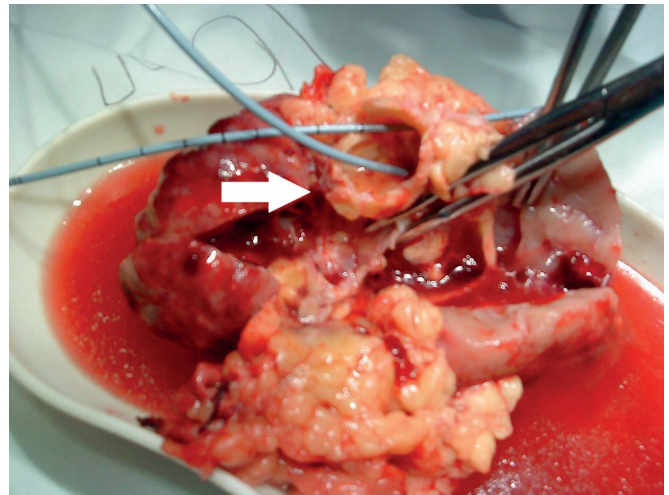


**Fig. 4.** CT scan: annular calcification (arrow) in the projection of pelvis of the right kidney, at the bifurcation of the right renal artery causing the hydronephrosis. This is the clear criteria for the differentiating the completely calcified aneurysm of the renal artery.

The CT scan revealed the aneurysm at the bifurcation of the renal artery. The patient was transferred to the Department of the Angiosurgery, where the aneurysm was excised and the autotransplantation of the kidney was performed. Fig. 6 – 13.

We analyzed the both cases from the point of view of urologist because the patients were sent to the Urological Department for the operative treatment, in one case urgently with the renal colic.

During the examination by USG and KUB the common finding in the both patients was the symptom of radio-opaque shadow with noncomplete circle, radiolucent in the center. But during the USG these structures were



**Fig. 5.** Removed kidney: the calcified aneurysm (arrow) is widely open with catheters inserted into the proximal and distal part of the right renal artery.

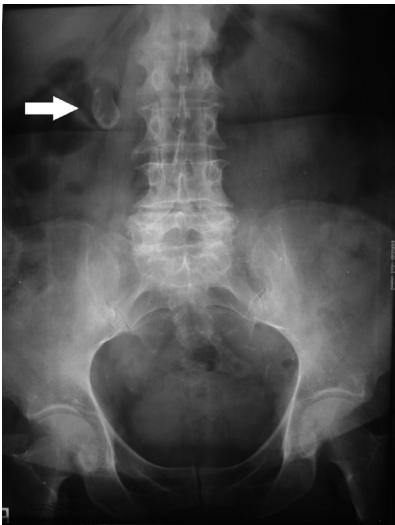
hyperechogenic with acoustic shadow resembling the stone, during the color dopplerography the echosignal could not penetrate into the aneurysm because of the total calcinosis of the wall.

The USG with dopplerography cannot be the method of first choice of differentiation between the calcified aneurysm and renal stone. Presence the radio-opaque shadow with interrupted circle on KUB is the indication for the CT with contrast enhancement, because only this method can distinguish between the kidney stone and calcified aneurysm of the kidney.

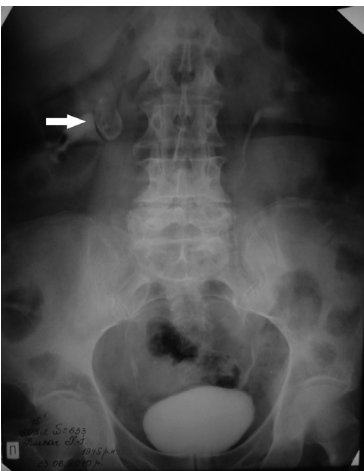




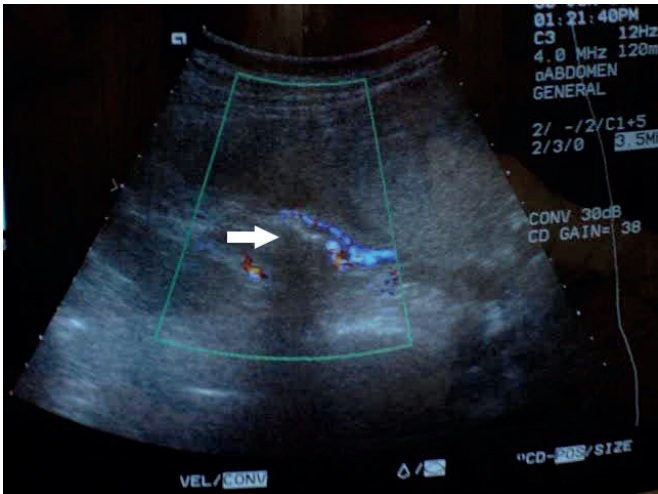
**Fig. 6.** Ultrasonography: hyperechogenic shadow (arrow) resembles the stone in the projection of pelvis of the right kidney with the acoustic shadow, compresses the pelvis and causes the pyelectasis.



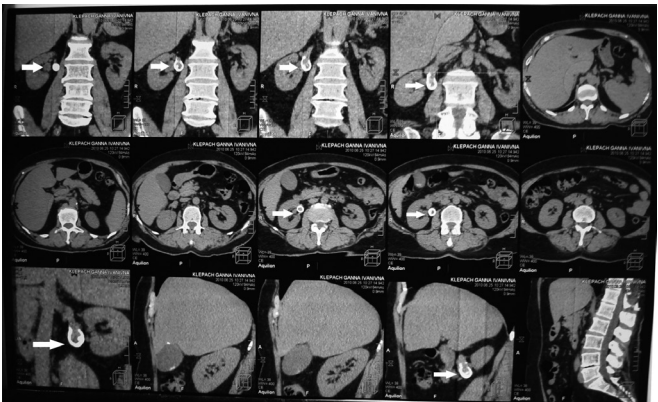
**Fig. 7.** KUB urography. There is the radioopaque oval shadow (arrow) in the projection of right kidney.



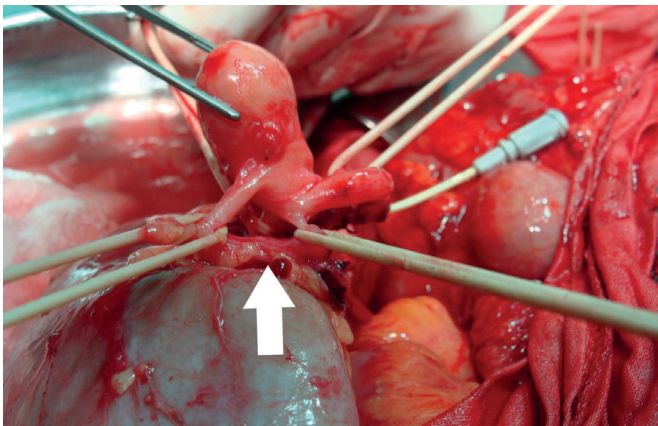
**Fig. 8.** Intravenous urography, 15 minute: the contrast fills the collecting system of the right kidney, pyelectasis is caused by compression of pelvis and pyeloureteral segment by the radioopaque oval calcified mass lesion (arrow). The excretory function of right kidney is normal



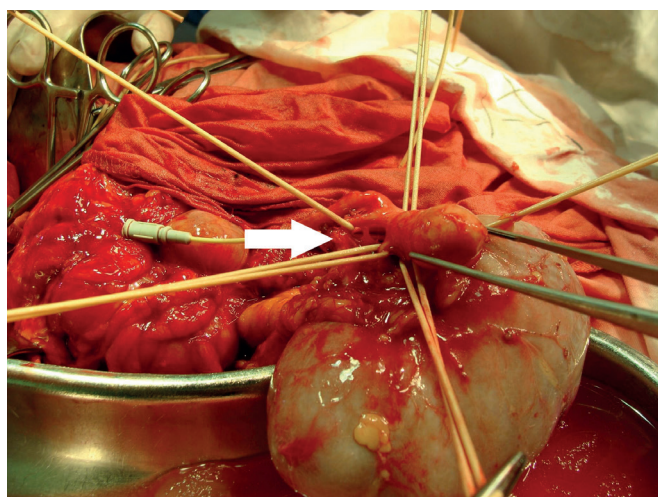
**Fig. 9.** Ultrasonography with color dopplerography: the hyperechogenic lesion with the acoustic shadow (arrow) resembling the stone is localized in the projection of the right renal pelvis, compressing the pelvis and causing the pyeloectasis. The segmental branch of the right renal artery is situated near the hyperechogenic shadow. Ultrasound cannot penetrate inside the completely calcified aneurysm and confirm the diagnosis; therefore the color dopplerography cannot be used for the differential diagnosis of the calcified aneurysm.



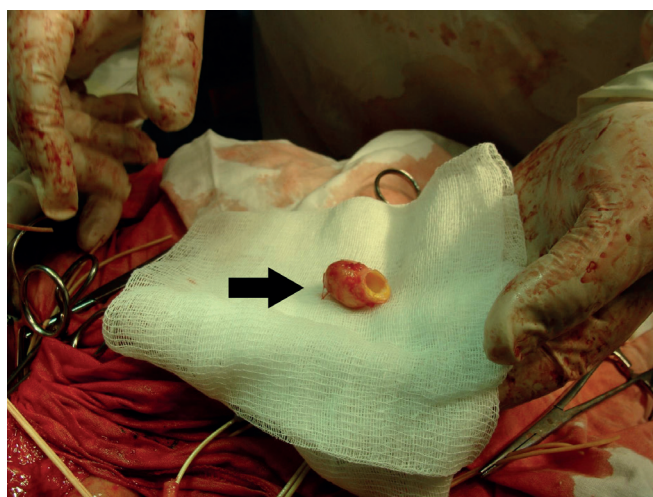
**Fig. 10.** CT scan: the annular oval-shape calcification is situated near the pelvis of the right kidney at the right renal artery bifurcation, compressing the pelvis and PUJ – this is the differential criterion of the completely calcified aneurysm of the renal artery.



**Fig. 11.** Operation: autotransplantation of the right kidney with the excision of aneurysm and graphing of the right renal artery. Please note the completely calcified aneurysm (arrow) at the bifurcation. Four segmental branches of the right renal artery are withdrawn by the tourniquets. The central renal artery was excised, through it the catheter was inserted into the kidney in order to wash the blood out. The right kidney was covered by ice.



**Fig. 12.** The picture was taken during the autotransplantation of the right kidney with excision of aneurysm (arrow) and graphing the right renal artery.



**Fig. 13.** Picture of the excised calcified aneurysm (arrow) of the right renal artery.

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## Conflict of interest:

The Author declare no conflict of interest.

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