*Case report*

*Med Ultrason 2023, Vol. 25, no. 4, 466-468*
**DOI:** 10.11152/mu-3889

# CEUS utility in the diagnosis of a stage I renal cancer developed on polycystic kidney. A case report.

**Adriana Maria Gomotîrceanu[1], Adina Sabău[2], Florin Gomotîrceanu[3], Bogdan Gomotîrceanu[3], Corina Ioniță[2], Mirela Liana Gliga[4]**

[1]Department of Internal Medicine and Ultrasonography, Topmed Medical Center, [2]Department of Oncology Topmed Medical Center, [3]Department of Surgery Topmed Medical Center, [4]Department of Nephrology, "George Emil Palade" University of Medicine, Pharmacy, Science and Technology, Targu Mures, Romania

**Abstract**

We present the case of a 49-year-old patient with polycystic kidney disease in which, in the pre-transplant CT-scan evaluation, a Bosniak III cyst was found in the left kidney. After contrast enhanced ultrasound (CEUS) examination the cyst was interpreted as a Bosniak IV malignant cyst and surgical resection of the kidney was realised. The pathology report showed papillary renal cell carcinoma. This case report emphasizes the role of CEUS in polycystic kidney disease examination.

**Keywords**: polycystic kidney disease; Bosniak classification; renal cell carcinoma; contrast enhanced ultrasound

## Introduction

Polycystic kidney is a condition that can compromise in time renal function and represents one of the indications for organ transplant. For this reason, the imaging evaluation in these patients must be detailed in order to exclude malignancy. The contrast enhanced ultrasound (CEUS) is a reliable imaging technique, frequently used for differential diagnosis and for the characterisation of cysts in the polycystic kidney based on the Bosniak classification of renal cysts [1].

The Bossniak classification is considered to be the gold standard when evaluating renal cysts [2]. Computed tomography (CT) scans were first used to describe these lesions, but now CEUS is the main imaging tool. It can be easily applied to a large number of patients, including those with renal impairment, in which contrast enhanced CT scans are contraindicated [3,4].

In this case report we present the diagnosis by CEUS of a malignant cyst within a polycystic kidney disease of a patient proposed for transplantation.

## Case report

A male patient, 49 years of age, with a medical history of polycystic renal disease and stage 5 renal insufficiency requiring regular dialysis, had performed a contrast enhanced CT in transplant medical unite. A Bosniak III renal cyst in the left polycystic kidney was described, without specifying the nature of the tumor. For this reason, the urologist recommended CEUS.

VOLUSON E8 machine (General Electric Medical System Kretztechnik Austria), with 4D abdominal transducer, 3-5 MHz frequency was used for examination. In grey scale ultrasound the left kidney, measuring 130/55 mm, was completely transformed, with multiple transonic cystic lesions. In the middle part of the kidney a cystic tumor of 4.5/4.1 cm, with thick echogenic walls, mixed content with an echogenic irregular solid mass attached to the cystic wall surrounded by a liquid transonic content (fig 1a) and without color Doppler signal at the matrix level was found.

Received 28.09.2022 Accepted 12.01.2023
Med Ultrason
2023, Vol. 25, No 4, 466-468
Corresponding author: Adriana Maria Gomotîrceanu
Department of Internal Medicine and Ultrasonography, Topmed Medical Center,
1-11 Dorobantilor street,
540156 Târgu Mureș, Romania
Email: adriana@topmed.ro
Phone: 0724 566 965

CEUS was performed using 2.4 ml intravenous bolus injection of SonoVue® (Bracco SpA, Milan, Italy) followed by a 10 ml saline flush via the left cubital vein. In the arterial phase, at 10 seconds, an intense enhancement of the solid mass and the cyst's walls was obtained, followed by the initiation of the washout during the early venous phase (fig 1b). The washout continued during the parenchymal phase and was complete after 7 minutes and 30 seconds (fig 1c,d,e). The cyst was interpreted as aBosniak IV malignant cyst.

The patient was addressed to the Urology and Renal Transplant Clinic with the indication of surgical resection. A left laparoscopic retroperytoneal total nephrectomy was performed, with a favourable outcome postsurgery. The pathology report confirmed the presence of the malignant cyst, with papillary renal cell carcinoma, type I, grad 2 Fuhrman, limited to the renal parenchyma, without angiolymphatic invasion.

After 2 years of follow up no relapse or metastasis were found.

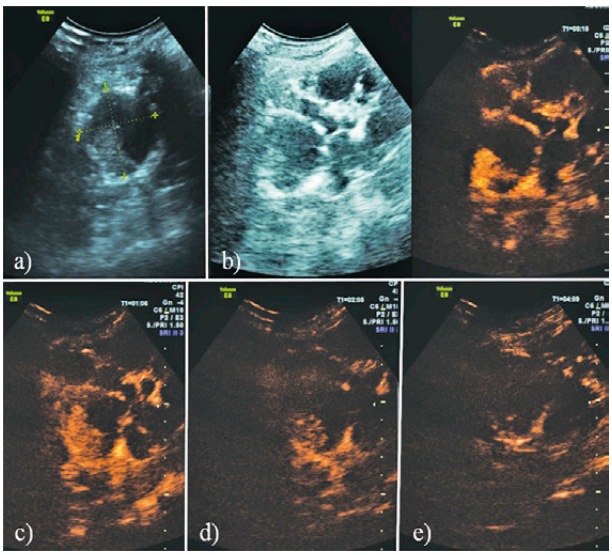



**Fig 1.** a) Gray scale ultrasound - the echogenic mass detected in one of the renal cyst (between calipers); b) CEUS examination - increased uptake of contrast media in the matrix of the cyst during the arterial time; c) a discreet wash-out in the intracystic formation begins in the venous time; d) the wash-out continues at 2 and 4 minutes (e) during parenchymal time.

## Discussion

The association between renal cell carcinoma (RCC) and autosomal dominant polycystic kidney disease (ADPKD) remains controversial but the prevalence of RCC was found to be higher in patients with ADPKD and end-stage renal disease [5]. Jilg et al study on 240 patients with ADPKD revealed that 5% of patients had a malignant tumor, predominantly renal cell carcinoma (RCC) [6]. The majority of RCC patients presented no evident symptoms and no abnormalities in the blood chemistry tests or urinalyses. Both pathologies being rare diseases, their association is often regarded as a coincidence [6,7]. By comparison, an ultrasound screening performed on a cohort of 219.640 persons identified RCC at a rate of 0.09% [8]. So, the risk of developing RCC is almost 100 times higher in ACKD than in the general population.

In gray scale ultrasound a solid intracystic mass attached to the cystic wall raises suspicions of either intracystic bleeding or a tumor, the presence of vascularisation in color Doppler being helpful in differentiating the two situations. But color Doppler is not sensitive enough in small or poorly vascularized tumors. In these cases, even contrast enhanced CT examination cannot properly characterise the mass. This was also our case – the CT scan interpreted the cyst as being Bosniak III and no color Doppler signal could be detected.

In these cases CEUS can bring supplementary data due to its capacity of the detection of blood flows in small lesions, hypovascular tumors and in thin septa [4,9] being more sensitive than CT [10]. In our patient the CEUS examination demonstrated the presence of vascularization in the arterial phase, followed by a wash-out earlier than the rest of the organ in venous phase, which was the sign of a malignant tumor.

## Conclusions

The high rate of RCC in patients with ADPKD and the lack of symptoms in these patients impose an extensive screening program. The first-choice imaging method for screening is ultrasound followed by CEUS when necessary. It should also be underlined that, in pre-transplanted patients with ADPKD, the examination of kidneys must be extremely thorough in order to exclude a malignant condition.

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