Ultrasonography in Evaluation of Renal Function at Autosomal Dominant Polycystic Kidney Disease: a case report

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Citation

P Yovchevski, N Smilov, I Kostadinova. *Ultrasonography in Evaluation of Renal Function at Autosomal Dominant Polycystic Kidney Disease: a case report*. The Internet Journal of Urology. 2009 Volume 6 Number 2.

Abstract

Introduction: The purpose of this case report is to demonstrate the role of ultrasoundgraphy in renal function evaluation at autosomal dominant polycystic kidney disease (ADPKD). Case presentation: A 48-year-old man with ADPKD underwent percutaneous cyst evacuation because of two-month left flank pain. 165 ml cyst fluid was aspirated from one big cyst in the left renal hilum. Doppler ultrasonography exam and radioisotope scans were performed to evaluate the renal function. Initial Doppler ultrasonography detected an increased resistive index – 0.82, probably, due to a compression of renal vessels caused by the big renal cyst. 3 days after cyst aspiration, the resistive index decreased to normal – 0.65, but this did not correspond to improvement in renal function. Moreover, renograms showed significant impairment of left kidney's function – its share decreased from 45% to 11% and creatinine rose from 628 μmol/l to 660 μmol/l. Conclusion: Our case shows that percutaneous drainage is safe and feasible, and can help control pain but ultrasonography, the major diagnostic tool for polycystic disease, is not suitable for renal function evaluation at ADPKD.

INTRODUCTION

Autosomal dominant polycystic kidney disease (ADPKD) is characterized by progressive renal enlargement due to progressive cyst formation in both kidneys, always leading to renal failure. ADPKD treatment focuses on slowing of the renal failure progression, treating symptoms and complications of the disease. Pain is a common complaint in patients with polycystic kidney disease [1]. The causes of the pain are multifactorial. The mechanical low back pain caused by cyst enlargement [2] is frequent in clinical practice. Sometimes it requires a percutaneous cyst evacuation.

Radioisotope nephrography is an acknowledged method for examining renal function, but the feasibility of Doppler ultrasonography (DU) in monitoring renal function before and after cyst evacuation is not proved. As the role of DU in the examination of variety of renal disorders is rapidly increasing [3, 4], we analyzed the change in the Doppler sonogram in ADPKD patient before and after cyst evacuation.

CASE PRESENTATION

A 48-year-old man with autosomal dominant polycystic kidney disease came to the emergency department with a left flank pain. The pain occurred about two months before that. The pain tended to increase in standing position and walking. It was resistant to every modality of therapy with systemic non-narcotic analgesics. Physical examination showed palpable kidneys, abdominal left upper quadrant tenderness and pain. Initial laboratory test results at admission showed abnormal laboratory values of uric acid 425 μmol/l, creatinine 628 μmol/l and urea 18.6 mmol/l. Urinalysis was positive for ketones. Ultrasound examination showed a big cyst - measuring 8.2 cm in diameter in the hilum of the left kidney. After we excluded infection and lithiasis, we concluded that the pain was directly related to cyst compression. The patient underwent percutaneous cyst evacuation. 165 ml cyst fluid was aspirated from the cyst using ultrasound-guided needle aspiration. Doppler ultrasonography exam and radioisotope scans were performed before and after cyst evacuation to evaluate the renal function. Initial DU detected an increased resistive index – 0.82 (Figure 1a), probably, due to a compression of renal vessels caused by the big renal cyst. Resistive index 3

days after cyst aspiration decreased to normal – 0.65 (Figure 1b), but this did not correspond to improvement in renal function. Moreover, renograms showed significant impairment of left kidney's function – its share decreased from 45% (Figure 2a) to 10% (Figure 2b) and creatinine rose from 628 μmol/l to 660 μmol/l.

Figure 1

Figure 1a: Color Doppler ultrasoundgraphy - spectral Doppler waveform, before cyst evacuation, demonstrating high resistivity index - 0.82.

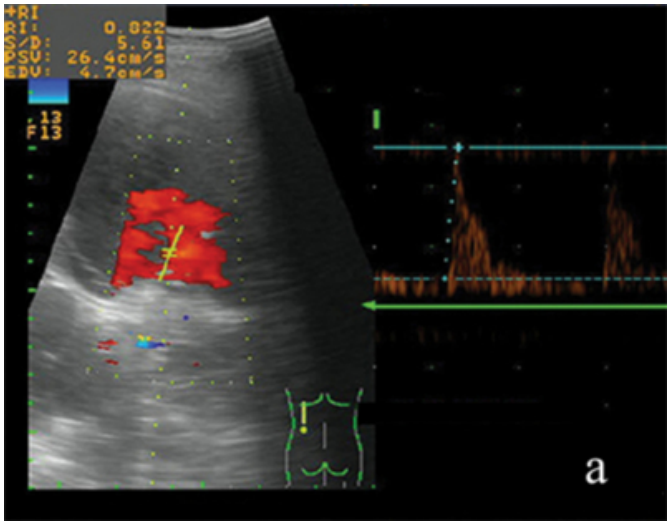


Figure 2

Figure 1b: Color Doppler ultrasoundgraphy - Doppler sonogram, obtained 3 days after cyst evacuation, showing a decrease in resistivity index - 0.65

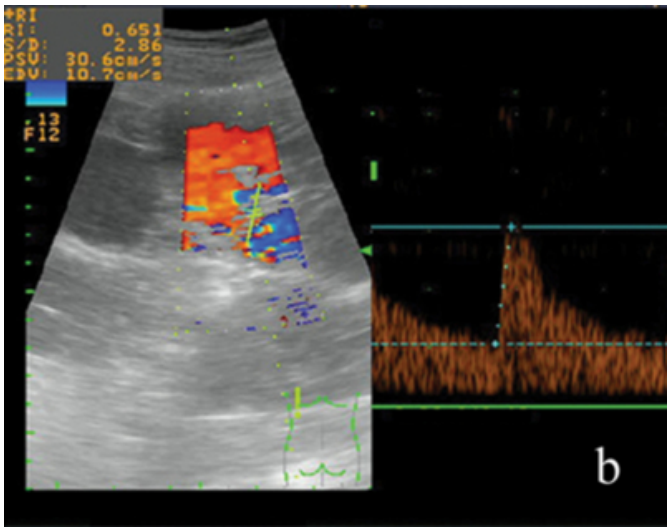


Figure 3

Figure 2a: Renal scintigraphy - radioisotope scans, before cyst evacuation, demonstrating a symmetric renal function.

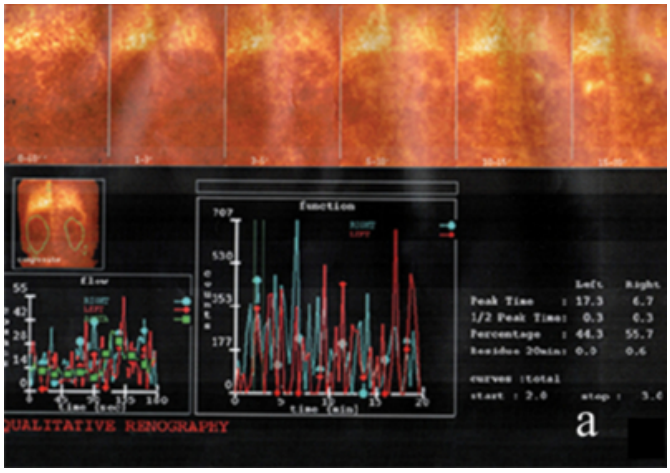
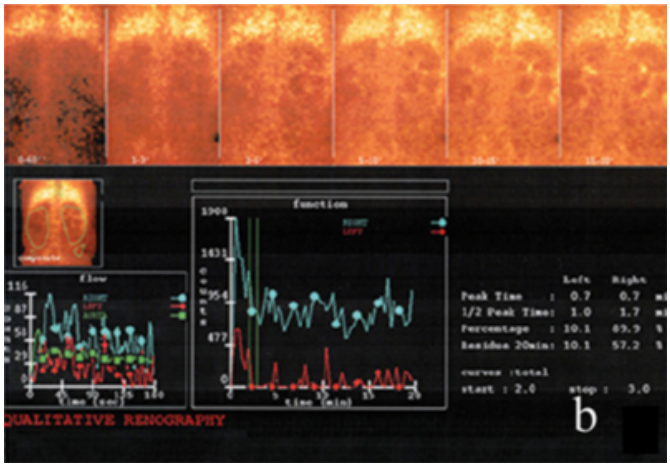


Figure 4

Figure 2b: Renal scintigraphy - radioisotope scans, obtained 3 days after cyst evacuation, showing the deterioration of the function of the left kidney.



DISCUSSION

Chronic back pain is a common and frustrating problem in ADKPD. The mechanical form of back pain tends to get worse over time. Pain occurrence can be caused by cysts compressing the surrounding tissues, traction on the pedicle of the kidney, and stretching of the renal capsule. The pain severity correlates with the size of the kidneys [2]. Simple cyst aspiration can ease pain for some time; showing that cyst distention can be a cause of pain [5]. A common aspiration technique is percutaneous aspiration of the cysts under ultrasound guidance [6].

In 1960s, there already reports that this procedure itself accelerates renal damage [7]. As the cyst puncture may make

the condition worse, the examination of renal function before and after cyst aspiration is very important. The decompression of renal vessels after evacuation decreases the ischaemia of the distal portions of the renal parenchyma. This is proved by the improvement of the resistive index. But decompression of renal vessels after renal cyst evacuation worsens renal function with a loss of parenchymal function as shown by the radioisotope nephrography.

The failure of the RI to live up to its promise as a parameter for measuring changes in renal status in polycystic kidney disease may be due to the pathophysiology of disease. DU assesses induced flow changes, but in the critically damaged distal portion of renal parenchyma these changes do not lead to any function improvement.

CONCLUSIONS

The reported case shows that percutaneous drainage is safe and feasible, and can help control pain when it is due to the distortion of the kidney by large cysts. But the case also shows that DU, the major diagnostic tool for polycystic disease [8], is not suitable for renal function evaluation after cyst aspiration at ADPKD. There was no correlation between the deterioration of renal function (assessed by radionuclide renography and serum creatinine values) and the improvement of the RI after the cyst evacuation.

ACKNOWLEDGEMENTS

We thank the patient for his contribution to this study.

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