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Concurrent Large Adrenal Cyst and Autosomal Dominant Polycystic Kidney Disease

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Abstract. ***Background:*** Autosomal dominant polycystic kidney disease is a multisystem genetic disorder which most commonly causes renal failure worldwide. While it primarily affects the kidney, it is associated with multiple extra-renal manifestations like hepatic cyst, intracranial aneurysm and cyst of multiple other organs like seminal vesical, pancreas, spleen and arachnoid membranes. This case highlights the diagnostic complexity of adrenal cystic lesions in patients with ADPKD, where hypertension and radiologic overlap may obscure the distinction between functional adenomas and benign cysts.

Case presentation: A male in his late 60s with autosomal dominant polycystic kidney disease (ADPKD) was incidentally found to have a large right adrenal cyst. Given the coexistence of hypertension and chronic kidney disease, a detailed evaluation was undertaken to differentiate between a functional adrenal lesion and a benign cyst. Hormonal assays including plasma metanephrines, urinary catecholamines, serum cortisol, serum potassium and plasma aldosterone-renin ratio were within normal limits, effectively ruling out pheochromocytoma, cortisol-secreting lesions and primary hyperaldosteronism. Imaging revealed a thick-walled cyst with internal septations and calcifications. Laparoscopic adrenal cyst excision was performed due to its large size and indeterminate radiological features. Histopathology confirmed an adrenal pseudocyst.

Conclusions: The association of ADPKD with an adrenal cyst is rare. In ADPKD patients, any adrenal mass should prompt a structured endocrine evaluation to exclude functional lesions. A multidisciplinary approach is vital for accurate diagnosis and management.

Keywords: adrenal cyst, ADPKD, chronic kidney disease, laparoscopic adrenal cyst excision.

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Didelė antinksčių cista ir autosominiu dominantiniu būdu paveldima policistinė inkstų liga

Santrauka. ***Įvadas:*** Autosominiu dominantiniu būdu paveldima policistinė inkstų liga (ADPKD) yra daugiasistemis genetinis sutrikimas, kuris visame pasaulyje yra dažniausia inkstų nepakankamumo priežastis. Nors ši liga pirmiausia pažeidžia inkstus, ji susijusi su daugybe neinkstinių požymių, pavyzdžiui, kepenų cistomis, intrakranijinėmis aneurizmomis ir cistomis daugelyje kitų organų, tokių kaip sėklinių pūslelių, kasos, blužnies ir arachnoidinių membranų. Šis atvejis pabrėžia antinksčių cistinių pažeidimų diagnostinį sudėtingumą pacientams, sergantiems ADPKD, kai hipertenzija ir radiologiniai radiniai gali apsunkinti funkcinių adenomų ir gerybinių cistų atskyrimą.

Atvejo aprašymas: 60-ies metų vyrui, sergančiam ADPKD, atsitiktinai buvo nustatyta didelė dešiniojo antinksčio cista. Atsižvelgiant į kartu pasireiškiančią hipertenziją ir lėtinę inkstų ligą, buvo atliktas išsamus tyrimas, siekiant atskirti funkcinį antinksčių pažeidimą nuo gerybinės cistos. Hormonų tyrimų rezultatai, įskaitant metanefrinų koncentraciją plazmoje, katecholaminų kiekį šlapime, kortizolio koncentraciją serume, kalio koncentraciją serume ir aldosterono bei renino santykį plazmoje, neviršijo normos, todėl buvo galima veiksmingai atmesti feochromocitomą, kortizolį išskiriančius pažeidimus ir pirminį hiperaldosteronizmą. Vaizdo tyrimai parodė storasienę cistą su pertvaromis ir kalcifikacijomis. Dėl didelės antinksčių cistos ir neaiškių radiologinių požymių buvo atlikta laparoskopinė antinksčių cistos ekscizija. Histopatologinis tyrimas patvirtino antinksčių pseudocistą.

Išvados: ADPKD ir antinksčių cistos sąsaja yra reta. ADPKD sergantiems pacientams bet koks antinksčių navikas turėtų būti priežastis atlikti sistemingą endokrinologinį tyrimą, siekiant atmesti funkcinius pažeidimus. Tiksliai diagnozei nustatyti ir gydymui užtikrinti būtinas daugiadisciplinis požiūris.

Raktažodžiai: antinksčių cista, ADPKD, lėtinė inkstų liga, laparoskopinė antinksčių cistos pašalinimo operacija.

Introduction

Autosomal dominant polycystic kidney disease (ADPKD) is the most common genetic cause of renal failure worldwide, with a prevalence of approximately 1:400–1:1,000 [1]. It is a multisystem disorder characterized by progressive bilateral renal cyst formation, hypertension, and end-stage renal disease (ESRD). While it primarily affects the kidneys, it is associated with multiple extrarenal manifestations, such as hepatic cysts, cardiovascular abnormalities, and intracranial aneurysms, which contribute significantly to morbidity. Cysts are also seen in multiple other organs such as pancreas, spleen, seminal vesicles and even arachnoid membranes [1]. Association of a large adrenal cyst with ADPKD has not yet been found as per our literature search. We present a rare case of an adrenal cyst in an ADPKD patient, highlighting diagnostic complexities and management strategies.

Case Presentation

A 68-year-old man with ADPKD and stage 3b chronic kidney disease was incidentally detected to have a right adrenal cyst on ultrasonography. He had controlled hypertension on amlodipine (5 mg OD) and metoprolol (12.5 mg OD). There were no symptoms suggestive of catecholamine or cortisol excess. Laboratory investigations revealed a haemoglobin level of 12.2 g/dL, serum creatinine level of 2.94 mg/dL, and serum potassium level of 4.2mEq/L. Ultrasound abdomen showed bilateral enlarged kidneys with multiple cortical cysts and mildly increased echogenicity, without hydronephrosis. Ultrasound also revealed a large thick-walled cystic lesion measuring approximately 12.7 × 10.2 cm in the hepatorenal region (Figure 1). His early morning serum cortisol, Urine metanephrine

(24 hrs) and plasma free metanephrines levels were within normal limits. NCCT abdomen was performed, which showed cystic lesion in the right suprarenal region (10–12 HU) with coarse peripheral calcification (Figure 1). MR Urography was performed to further characterize the adrenal cyst. MRI revealed a solitary, well-defined, thick-walled, predominantly cystic lesion measuring on T1 and T2 weighted images in the hepatorenal space with multiple calcifications and a small solid component (Figure 2).

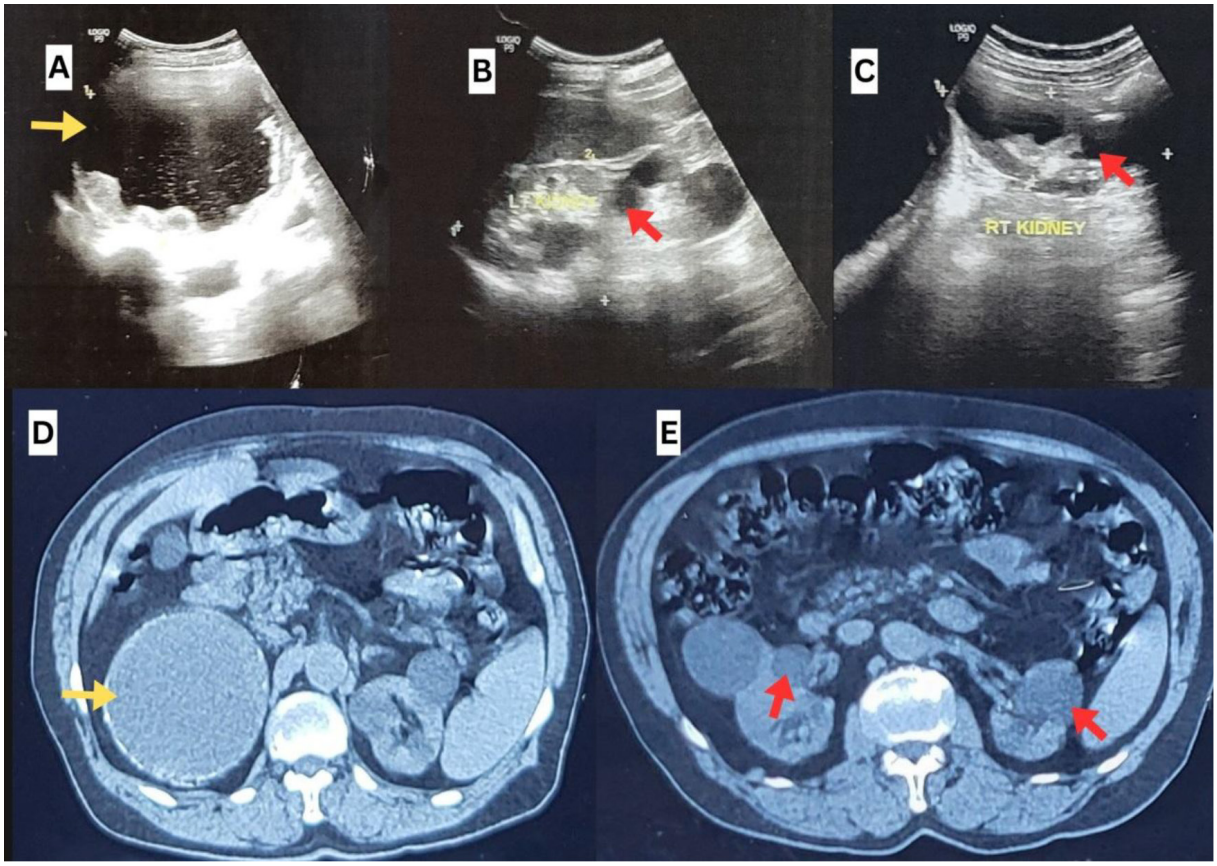


Figure 1. Initial radiological investigations
(A) An abdominal ultrasound image showing a large, thick-walled cystic lesion in the hepatorenal region (the yellow arrow).
(B & C) Ultrasound images demonstrating multiple cortical cysts in both the left and right kidneys (the red arrows).
(D & E) Axial views from a non-contrast computed tomography (NCCT) scan of the abdomen, which reveal a large cystic lesion in the right suprarenal area (the yellow arrow) along with multiple bilateral renal cysts (the red arrow), consistent with a right adrenal cyst and Autosomal Dominant Polycystic Kidney Disease (ADPKD)

Considering the large adrenal cyst with a solid component, the patient underwent laparoscopic adrenal cyst excision. Intraoperatively, a unilocular thick fluid-filled cyst was found. The cyst was excised completely, with sparing of adjacent normal adrenal parenchyma. Microscopic examination revealed an adrenal pseudocyst, characterized by a thick, fibrous wall composed of collagen, which lacked true epithelial lining (Figure 2). His postoperative hospital stay was uneventful, and the patient was discharged on postoperative day 4. He was counselled regarding ADPKD, and lifestyle modifications were advised such as restricted sodium intake, as well as adequate hydration.

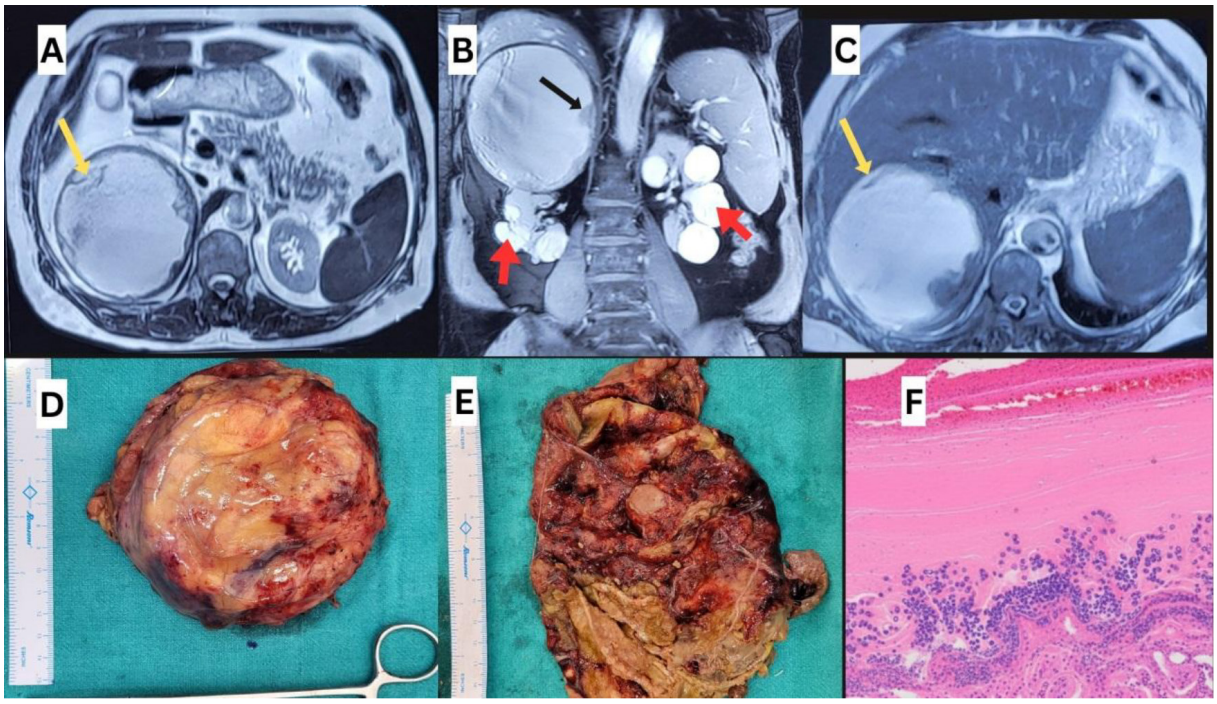


Figure 2. Advanced imaging, surgical view, and pathological examination
(A), (B), and (C) T2-weighted magnetic resonance imaging (MRI) scans showing a large, solitary cystic lesion in the right suprarenal region (the yellow arrows) and multiple cysts in the kidneys (the red arrow).
(D) An intraoperative view during the laparoscopic adrenal cystectomy, displaying the adrenal cyst (the yellow arrow), liver (the black arrow), and the upper pole of the right kidney (the black arrow).
(E) The gross specimen of the excised adrenal cyst.
(F) A microscopic view of the histopathology slide, showing a fibrous wall characteristic of a pseudocyst

Discussion

The coexistence of adrenal cysts with autosomal dominant polycystic kidney disease (ADPKD) is exceedingly rare, with only isolated case reports in the literature, such as the bilateral adrenal cysts described by Bastide et al. [2]. Hypertension occurs in nearly 50–75% of patients with autosomal dominant polycystic kidney disease (ADPKD), and it often precedes renal impairment. The pathogenesis primarily involves intrarenal activation of the renin–angiotensin–aldosterone system (RAAS), but secondary causes such as primary aldosteronism (PA) can occasionally coexist [3]. Given the multisystem nature of ADPKD, which involves cyst formation in the liver, pancreas, spleen, and seminal vesicles, it is intriguing to consider whether cystogenesis mechanisms may extend to the adrenal tissue. Although no definitive link has been established, emerging molecular data suggest that PKD1 and PKD2 gene expression occurs in various epithelial tissues, including adrenal cortical cells. Dysfunction in polycystin-1 and polycystin-2 may theoretically disrupt ciliary signaling and epithelial polarity, predisposing to cystic transformation even beyond the kidney [4]. However, current evidence remains circumstantial, and most experts still regard adrenal cysts in ADPKD as incidental findings rather than part of the disease spectrum.

Radiologic differentiation between an adrenal and a renal cyst can be difficult in ADPKD because enlarged polycystic kidneys distort the retroperitoneal anatomy. MRI or contrast-enhanced CT aids localization, but when imaging remains indeterminate or lesions are large (> 5 cm), surgical excision serves both diagnostic and therapeutic purposes [5].

In our case, the large cyst abutting the upper pole of the kidney initially raised suspicion for an adrenal or renal origin. Functional evaluation conclusively excluded endocrine activity, guiding the surgical plan toward curative excision for mass effect and diagnostic certainty, rather than hormonal control. A multidisciplinary team comprising nephrologists, urologists, an endocrinologist and radiologists were involved in the decision-making process in this case. The outcome after complete excision of adrenal pseudocysts is generally favourable with low recurrence.

Conclusion

In ADPKD patients, any adrenal mass should prompt a structured endocrine evaluation to exclude functional lesions. Large or complex adrenal cysts, even when non-functional, require surgical excision to establish diagnosis and prevent complications. A multidisciplinary approach is vital for accurate diagnosis and management.

Funding Declaration

No specific funding was assigned to this research.

Ethical Clearance

Written and informed consent was taken from the patient.

Author contributions

B. K.: Conceptualization, Data Curation, Investigation, Methodology, Project Administration, Writing – Original Draft Preparation.

A. K.: Conceptualization, Methodology, Writing – Original Draft Preparation, Writing – Review & Editing.

K. G.: Conceptualization, Investigation, Methodology, Project Administration, Supervision, Validation, Writing – Review & Editing.

Raj. K.: Project Administration, Validation, Writing – Original Draft Preparation, Writing – Review & Editing.

Rak. K.: Conceptualization, Investigation, Methodology, Project Administration, Supervision, Validation, Writing – Review & Editing.

Conflict of Interest

All authors declare to have no conflict of interest.

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