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# A Wolf in Sheep's Clothing: Xanthogranulomatous Pyelonephritis Mimicking Infection Revealing Underlying Renal Squamous Cell Carcinoma

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**ABSTRACT**

**Introduction:** Renal masses associated with chronic infection may pose significant diagnostic challenges because inflammatory changes can closely mimic malignant lesions on imaging studies.
**Case Study:** We report the case of a 59-year-old man who presented with persistent abdominal pain and a palpable left abdominal mass. Initial ultrasonography suggested severe hydronephrosis caused by a proximal ureteral stone accompanied by a solid intrarenal lesion. Contrast-enhanced computed tomography demonstrated imaging features with differential diagnoses of Xanthogranulomatous Pyelonephritis (XGP) and malignant renal disease. Based on the clinical and radiological findings, the patient underwent left nephrectomy. However, histopathological examination unexpectedly confirmed Renal Squamous Cell Carcinoma arising in the background of chronic inflammatory changes.
**Conclusion:** This case underscores the rare but important association between long-standing renal calculi, chronic infection, and renal squamous cell carcinoma. It also highlights the limitations of imaging in differentiating inflammatory from malignant renal masses and emphasizes that histopathological evaluation remains the gold standard for establishing a definitive diagnosis.

## INTRODUCTION

Xanthogranulomatous Pyelonephritis (XGP) is a rare chronic inflammatory condition of the kidney often associated with obstruction and infection. It can mimic renal malignancy clinically and radiologically. Conversely, primary Renal Squamous Cell Carcinoma is an extremely rare renal tumor, frequently associated with chronic irritation such as longstanding calculi and infection. Differentiating between these entities is challenging due to overlapping imaging features.[1–3] We present a case where presumed XGP masked an underlying squamous cell carcinoma in Central Java, Indonesia.

### Case presentation

A 59-year-old man patient was admitted to RSUD R. Sosodoro Djatikoesoemo Bojonegoro presented with a chief complaint of persistent left-sided abdominal pain for approximately two weeks, which gradually worsened and was

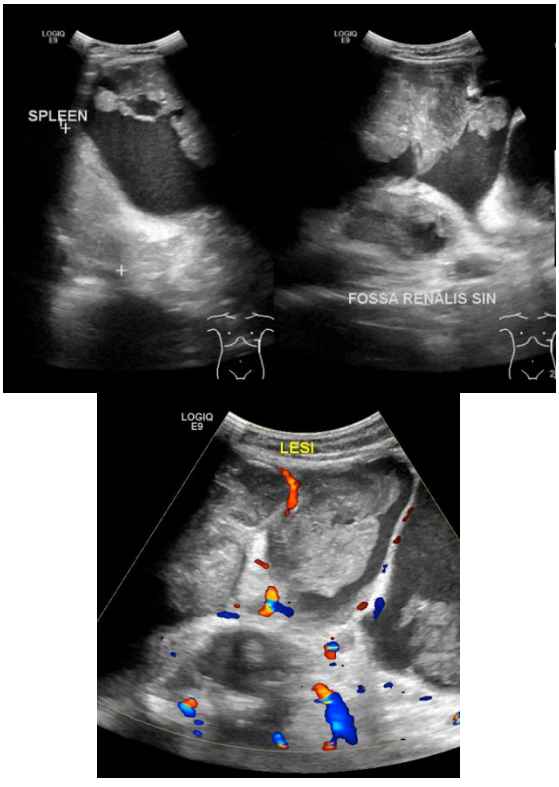
associated with a palpable mass in the left abdomen. The pain was described as dull and continuous, with intermittent exacerbations. The patient also reported low-grade fever and decreased appetite. There was no history of hematuria. On physical examination, a palpable mass was noted in the left abdominal region, with mild tenderness. Vital signs showed low-grade fever.

Laboratory investigations revealed leukocytosis and elevated inflammatory markers, suggesting an ongoing infectious or inflammatory process. Urinalysis demonstrated increased erythrocytes, leukocytes, proteinuria, and epithelial cells, consistent with chronic urinary tract inflammation. Renal function tests were within acceptable limits. Initial abdominal ultrasonography demonstrated severe hydronephrosis of the left kidney with cortical thinning, associated with a distal ureteral stone. In addition, a solid intrarenal lesion located within the calyceal system raised suspicion for an underlying renal mass.

Subsequently, contrast-enhanced Computed Tomography (CT) of the abdomen demonstrated an enlarged left kidney with multiple low-attenation areas replacing the renal parenchyma, measuring approximately 8 × 7 × 5 cm, resulting in a multiloculated appearance consistent with the classic **"Bear Paw Sign."** Associated findings included perinephric inflammatory fat stranding and an obstructing distal ureteral calculus. These imaging features were highly suggestive of Xanthogranulomatous Pyelonephritis (XGP). However, given the presence of a large infiltrative renal mass and extensive parenchymal destruction, an underlying renal malignancy could not be excluded. Therefore, the radiological differential diagnosis included both Xanthogranulomatous Pyelonephritis and other malignant renal disease.

Based on the clinical and radiological findings, the patient underwent left nephrectomy. Gross examination of the surgical specimen revealed a markedly enlarged kidney with areas of necrosis and destruction of normal renal architecture. Histopathological evaluation demonstrated malignant squamous differentiation with keratin pearl formation and intercellular bridges, confirming the diagnosis of Renal Squamous Cell Carcinoma. The postoperative course was uneventful, and the patient was referred for further oncological evaluation and management.

Histopathological examination revealed features consistent with Renal Squamous Cell Carcinoma.



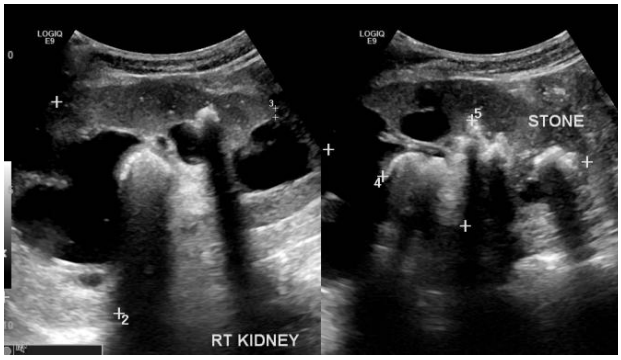
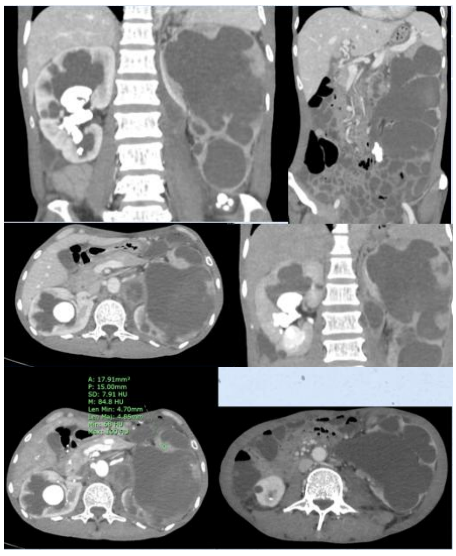



**Figure 1**. A complex solid–cystic lesion measuring approximately 8×7×5 cm with internal septations is identified, likely originating from the left kidney and occupying the left renal calyceal system. The lesion demonstrates extensive growth, extending superiorly into the epigastric region with close apposition to the inferior vena cava and abdominal aorta, and inferiorly into the left umbilical region. These findings are suspicious for a renal mass, associated with severe left-sided hydroureteronephrosis.

Additionally, multiple echogenic foci with posterior acoustic shadowing are observed within the left kidney, consistent with multiple renal calculi (left nephrolithiasis).

On the right renal, a large staghorn calculus is visualized occupying the renal pelvis and extending into the middle and lower pole calyces. This is associated with severe right-sided hydronephrosis. Bladder in normal limit.



**Abdominal CT finding**

**Figure 2**. Imaging findings were suggestive of left xanthogranulomatous pyelonephritis, accompanied by delayed function of the left kidney. A left proximal ureteral stone measuring about 1.4 × 3.2 × 1.7 cm was identified, causing severe left hydroureteronephrosis. Additionally, a right renal staghorn calculusmeasuring about 3.5 × 5.9 × 3.9 cm (AP × CC × LL), was observed, resulting in severe right hydronephrosis.

Xanthogranulomatous Pyelonephritis (XGP) is a rare form of chronic destructive renal inflammation typically associated with long-standing urinary tract obstruction, most commonly due to renal calculi. It is characterized by replacement of renal parenchyma with lipid-laden macrophages and inflammatory tissue, often resulting in an enlarged, poorly functioning kidney. Imaging findings, particularly on CT, frequently demonstrate the classic "bear paw sign," which reflects dilated calyces surrounded by inflammatory tissue.[1]

Despite these characteristic features, differentiating XGP from renal malignancy remains a significant diagnostic challenge. Radiological overlap is common, as both entities may present with renal enlargement, necrosis, hydronephrosis, and perinephric inflammatory changes. Even with advanced imaging modalities, preoperative distinction is often difficult, leading to frequent misdiagnosis.[2,4,5]

Renal Squamous Cell Carcinoma (SCC) is an extremely rare malignancy, accounting for less than 1% of all urinary tract tumors. It is strongly associated with chronic irritation of the urothelium, particularly in the setting of long-standing nephrolithiasis, infection, and hydronephrosis. Chronic inflammation may induce squamous metaplasia of the urothelium, which can

subsequently progress to dysplasia and carcinoma.[6,7]

The coexistence or misinterpretation of XGP and renal SCC is exceedingly rare but well documented in the literature. Several case reports have described patients initially diagnosed with XGP on imaging, with final histopathology revealing underlying SCC.[6] In some cases, both conditions coexist within the same kidney, further complicating diagnosis and management.[8]

Clinically, both XGP and renal SCC may present with nonspecific symptoms such as flank pain, abdominal mass, fever, and constitutional symptoms. Hematuria, although suggestive of malignancy, may not always be present, contributing to delayed or missed diagnosis.[6]

From a radiological perspective, the presence of obstructive urolithiasis, severe hydronephrosis, and inflammatory changes often biases the diagnosis toward XGP. However, focal enhancing soft tissue components, irregular masses, or atypical features should raise suspicion for an underlying malignancy. Nonetheless, imaging alone is insufficient for definitive diagnosis in many cases.

Importantly, nephrectomy remains both a diagnostic and therapeutic approach in such cases. Histopathological examination is the gold standard for diagnosis and may reveal unexpected malignancy, as demonstrated in this case. Early surgical intervention is often recommended, as renal SCC is an aggressive tumor with poor prognosis due to late presentation and early metastasis.[3,6,9,10]

Recent reports continue to emphasize this rare but clinically significant association. A 2024 case report described incidental detection of SCC in a kidney initially diagnosed with XGP, reinforcing the need for vigilance in chronic inflammatory renal conditions.[1]

This case highlights an important diagnostic pitfall in which chronic infection and obstruction masked an underlying malignancy. Clinicians and radiologists should maintain a high index of suspicion, particularly in patients with long-standing calculi and atypical imaging features. Multidisciplinary evaluation and consideration of early surgical management are crucial to avoid delayed diagnosis of aggressive renal tumors.

## CONCLUSION

Chronic renal inflammatory conditions such as Xanthogranulomatous Pyelonephritis may obscure underlying malignancy. This case highlights the importance of maintaining a high index of suspicion for Renal Squamous Cell Carcinoma in patients with long-standing obstruction and atypical imaging findings. Histopathological examination remains essential for definitive diagnosis.

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