Case Report

Xanthogranulomatous Pyelonephritis: An Uncommon Case Report Mimicking Sarcomatoid Renal Cell Carcinoma

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Abstract

Introduction:

Xanthogranulomatous pyelonephritis (XGP) is an atypical form of chronic pyelonephritis characterized by the destruction of renal parenchyma and its replacement with a chronic inflammatory infiltrate of xanthoma cells.

Case Report:

A 46-year-old male presented in the surgery outpatient department with abdominal pain and recurrent fever. Contrast-enhancing computed tomography (CECT) revealed a lobulated, irregularly shaped, heterogeneously enhancing lesion in the left kidney arising from the upper pole with mitotic activity. Left total nephrectomy was performed, and the specimen was sent for histopathology. The specimen measured 12x8.5x5.3cm. Grossly, a globular mass lesion measuring 9x7x2.4 cm was observed at the upper pole of the kidney. On cutting, an unencapsulated grey-white solid mass with ill-defined margins was identified in the upper pole of the kidney. Microscopically, sheets and bundles of oval to spindle-shaped cells amidst chronic inflammatory infiltrate and giant cells were seen. These cells exhibited moderate pleomorphism with large vesicular nuclei, irregular nuclear margins, clumped chromatin, and pale to eosinophilic ample cytoplasm. Immunohistochemistry (IHC) revealed strong positivity for both vimentin and CD68 and negativity for cytokeratin, CD10, and desmin. The final diagnosis of XGP was made.

Conclusion:

XGP has earned the title of the "great imitator" due to its overlapping gross and microscopic features with renal cell carcinoma (RCC). This overlap often leads to a delay in reaching a specific diagnosis. However, immunohistochemistry (IHC) helps to avoid such misdiagnoses in the majority of cases.

Keywords:

Chronic pyelonephritis, cytokeratin, sarcomatoid renal cell carcinoma, xanthogranulomatous pyelonephritis

Introduction

Xanthogranulomatous pyelonephritis (XGP) is a persistent inflammatory condition characterized by the infiltration of lipid-rich macrophages known as xanthoma cells. It is produced by a granulomatous reaction along with the destruction of the renal parenchyma [1]. It was originally reported in 1916 by Schlagenhaufer, currently accounting for 0.6-1% of histologically documented cases of pyelonephritis in adults and 16% of pediatric nephrectomy specimens [2].

The most common age group involved by this entity is the fifth and sixth decades, with females more frequently affected than males [3]. Although the precise cause of XGP is uncertain, it is generally agreed that the illness process is linked to persistent blockage, usually associated with staghorn renal calculi, followed by infection with common organisms such as Proteus mirabilis, Escherichia coli, Pseudomonas, Klebsiella, and Staphylococcus, along with various predisposing causes like diabetes, rheumatoid arthritis, and chronic viral hepatitis [4].

Patients may exhibit acute symptoms such as fever, chills, flank pain, and abdominal discomfort, leading to complications like psoas abscess, nephrocutaneous fistula, nephrocolonic fistula, paranephric abscess, emphysematous pyelonephritis, and ischemic colitis involving the transverse and descending colon as a result of compression by a large renal mass [5].

Computed tomography (CT) imaging investigations have become the standard for preoperative diagnosis [4]. The presence of a calculus inside the renal pelvis, non-functional expanded large kidney, inflammatory alterations in the perinephric, massive pelvic dilatation, and renal atrophy are various abnormal results seen on CT. However, the involvement of one pole/segment in the absence of calculus without dilatation of the pelvicalyceal system makes it challenging to distinguish XGP from neoplasms [6]. Because the clinical and radiological symptoms closely mimic those of a renal tumor, this disease has been named the great imitator [7]. Therefore, it might be difficult to distinguish XPG from malignant kidney tumors before surgery at certain times. Thus, for diagnosing XGP, histological diagnosis is the gold standard.

Case Report

A 46-year-old male presented in the surgery OPD with intermittent abdominal pain and recurrent fever for the last month, with no other significant complaints in the past. On ultrasonography (USG), a well-defined hypoechoic lesion measuring 8.7×4.9 cm was seen involving the upper pole of the left kidney. Contrast-enhanced computed tomography (CECT) showed a lobulated irregularly shaped heterogeneously enhancing lesion in the left kidney arising from the upper pole with mitotic activity. A preoperative diagnosis of renal cell carcinoma (RCC) was given, and a nephrectomy was performed.

The left total nephrectomy specimen measured 12x8.5x5.3 cm, with the upper pole of the kidney showing a globular mass lesion measuring 9x7x2.4 cm (Figure 1). The renal capsule was breached, and the adrenal gland was also identified in the fat attached to the upper pole of the kidney, measuring 4x1.5x0.5 cm. On the cut section, an uncapsulated, grey-white solid lesion was identified involving the upper pole of the kidney with areas of necrosis. The lesion was seen breaching the capsule and infiltrating the adjacent perirenal fat. However, the pelvicalyceal system and lower half of the renal parenchyma were unremarkable grossly. The upper part of the ureter was dilated but no stone was identified. The renal vein and artery were grossly unremarkable. The cut section of the adrenal gland was unremarkable.

Representative sections from the grey-white mass showed sheets and bundles of spindle to oval cells. These cells exhibited moderate pleomorphism with a large vesicular nucleus, irregular nuclear margin, clumped chromatin, prominent nucleoli, and a

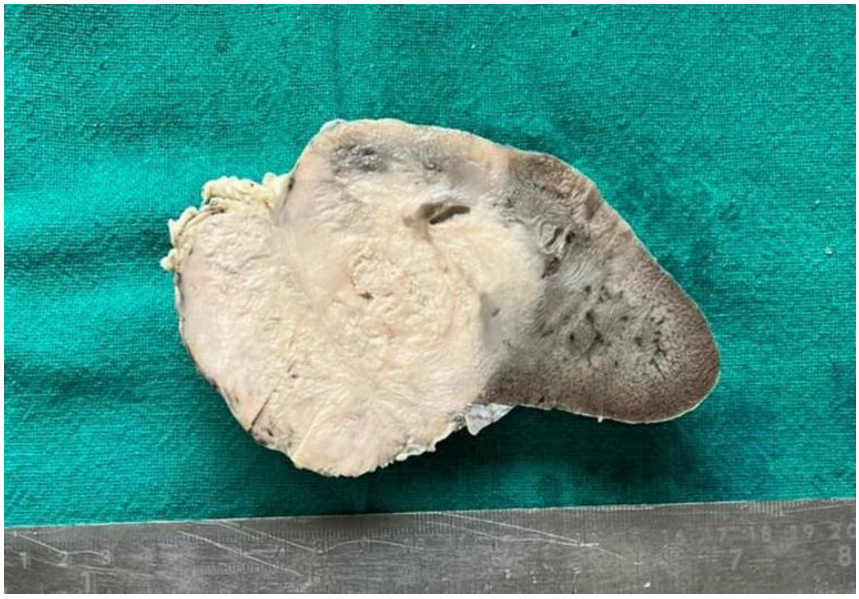

Figure 1: Gross examination shows an uncapsulated, grey white solid lesion involving the upper pole of kidney

pale to eosinophilic ample amount of cytoplasm. There were numerous interspersed multinucleated giant cells, mixed inflammatory cells including lymphocytes, neutrophils, eosinophils, and plasma cells, collagenous stroma, and a few foci of necrosis. Frequent mitosis (5/10 high power field) with occasional atypical forms was also seen. The section from the capsule and adjacent perirenal fat showed infiltration by spindle cells (Figures 2, 3, 4, 5). The section from the upper pelvis showed ulceration of the transitional lining by these spindle cells. Surrounding kidney tissue showed congestion and chronic interstitial inflammation. Sections from the ureter, renal vein, and renal artery were unremarkable. Sections from the adrenal gland showed congestion and focal hemorrhage.

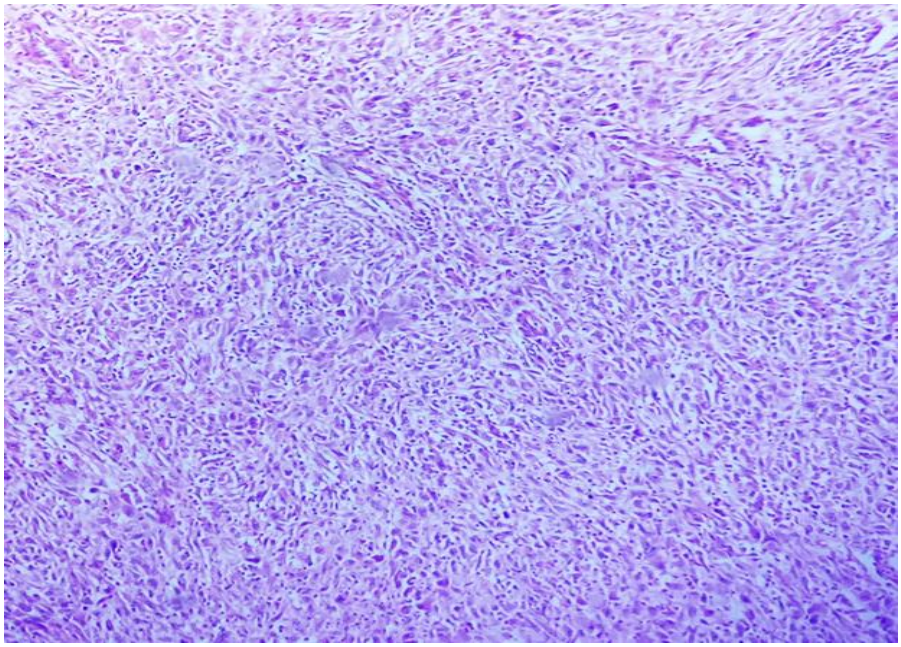

Figure 2: Microphotograph showing sheets of spindle cells amidst inflammatory infiltrate (H & E stain X100).

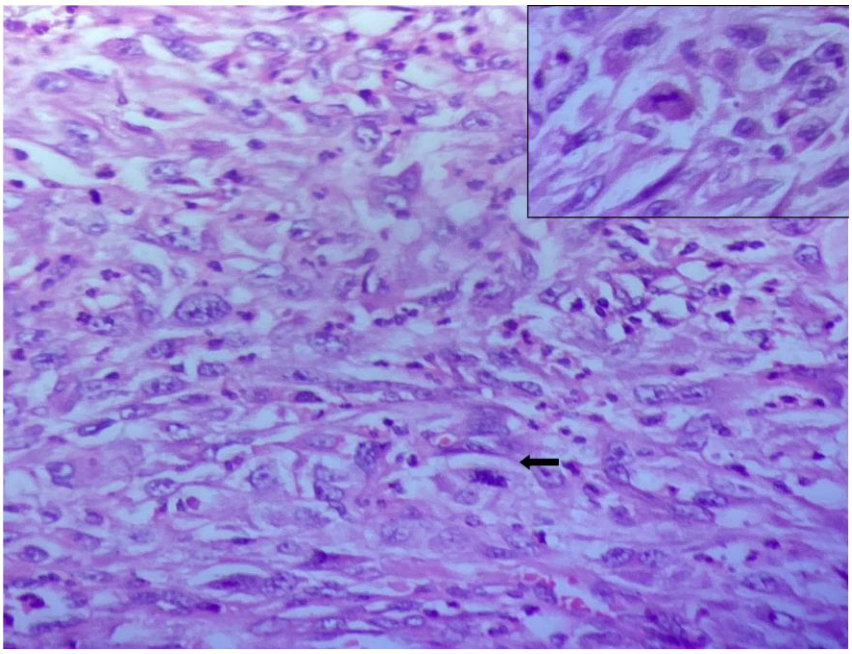

Figure 3: Microphotograph showing spindle cells with moderate pleomorphism and pale to eosinophilic moderate amount of cytoplasm with mitotic figure (arrow), inset shows mitosis (H & E stain X400).

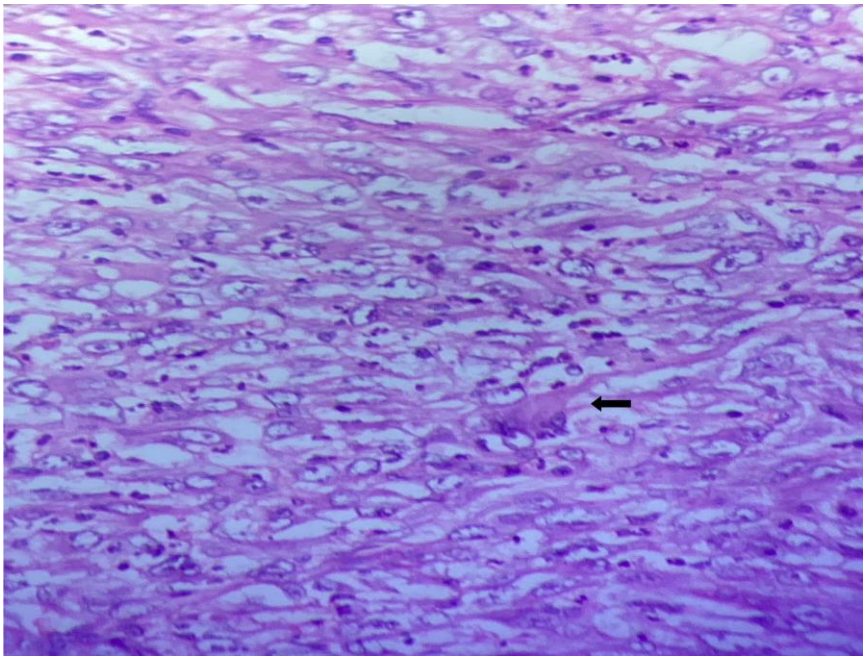

Figure 4: Microphotograph showing spindle cells with moderate pleomorphism admixed in a background of mixed inflammatory infiltrate with giant cell (arrow) (H & E stain X400).

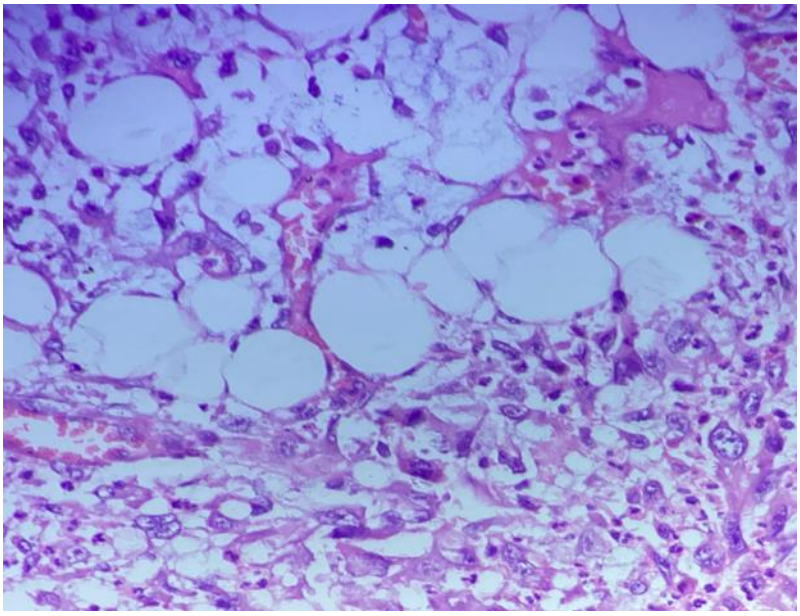

Figure 5: Microphotograph showing spindle cells infiltrating into the adjacent peri renal fat (H & E stain X400).

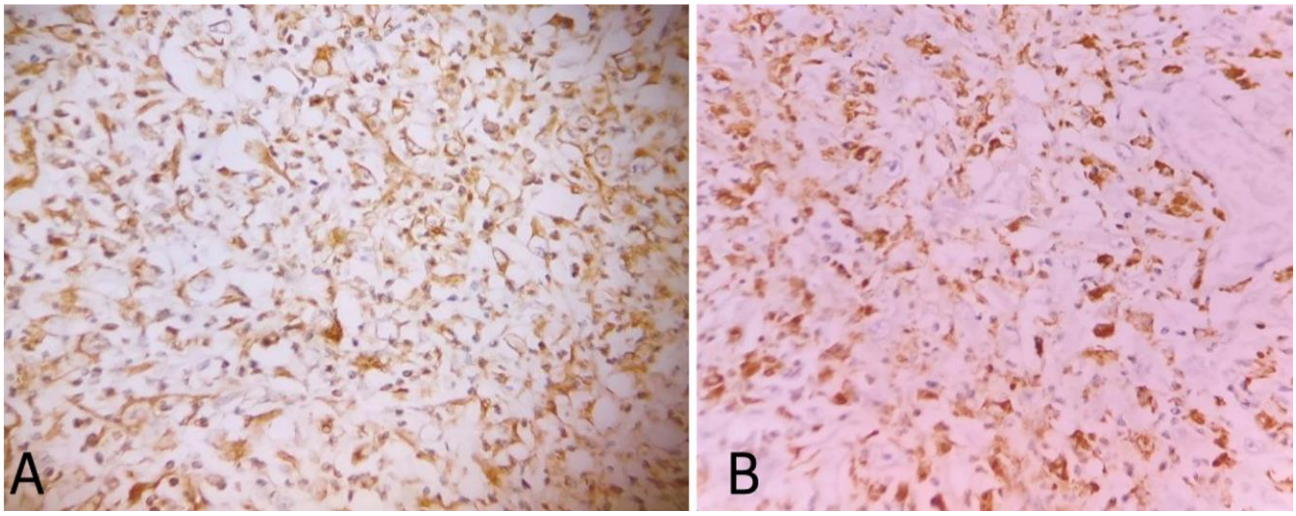

Figure 6: A. Micrograph 100x Magnification (Vimentin IHC) showing cells positive for Vimentin. B. Micrograph 100x Magnification (CD68 IHC) showing cells positive for CD68.

Due to the presence of a grey-white single infiltrating mass involving the upper pole of the kidney on gross inspection, spindle to oval cells with moderate pleomorphism reaching beyond the renal capsule, presence of mixed inflammatory infiltrate, and lack of areas revealing features of clear cell carcinoma, it was difficult to reach the final diagnosis. Differential diagnoses of XGP and sarcomatoid renal cell carcinoma were considered. On immunohistochemistry (IHC), the spindle cells were strongly positive for both vimentin and CD68, however negative for cytokeratin, CD10, and desmin (Figure 6). The final diagnosis based on histomorphological features and IHC was given as Xanthogranulomatous pyelonephritis. Following discharge, he remained asymptomatic and reported a smooth performance of his routine activities when contacted by phone six months later.

Discussion

XGP is rare, constituting 1% of all types of pyelonephritis in the adult population [8]. Although it is frequently observed in middle-aged women, no age group of either gender is spared. The most prevalent symptoms reported in a retrospective study on 41 cases of XGP by Korkes F. et al. were fever, flank or stomach discomfort, anorexia, weight loss, lower urinary tract symptoms, and gross hematuria. Females were more frequently involved than males, with an M:F ratio of 1:5.8. All patients had renal calculi, with 34.1% being of the staghorn type [3].

In the present case, the patient presented with a history of recurrent abdominal pain and fever. However, the CT scan revealed the presence of a mitotically active mass lesion involving the upper pole, thus RCC was kept as the clinical diagnosis. As there are many similarities in the clinical presentation of pyelonephritis and renal tumor like flank pain, hematuria, weight loss, and anorexia, it is important to reach the final diagnosis through histopathology. After correlating gross and microscopic features with clinico-radiological details, we kept a differential diagnosis of XGP and sarcomatoid renal cell carcinoma. Other differential diagnoses include non-neoplastic conditions like malakoplakia, megalocytic interstitial nephritis, and neoplastic conditions like leiomyosarcoma and Wilms' tumor [9]. Various immunohistochemical stains were performed, of which vimentin and CD68 were positive, helping to reach the final diagnosis in the present case. The exclusion of epithelial markers by IHC resolves any uncertainty. The xanthoma cells are CD68 positive and cytokeratin negative, and the reactive fibrous tissue is vimentin positive and cytokeratin negative.

In a study by Maiti et al., a 34-year-old female patient presented with complaints of intermittent left renal colic and gross hematuria for four months. A contrast-enhanced Magnetic Resonance Imaging (MRI) revealed a radiological diagnosis of transitional cell carcinoma of the renal pelvis with no enlarged locoregional lymph nodes. The specimen grossly consisted of an enlarged yellowish lobulated kidney with adherent perinephric fat measuring 15×18×5 cm. Microscopy revealed a diffuse inflammatory infiltrate composed of foamy histiocytes, multinucleated giant cells, lymphocytes, plasma cells, and polymorphonuclear leukocytes, confirming the diagnosis of the diffuse variety of XGP [9].

Rahman et al. reported a case of a 52-year-old male patient who presented with complaints of right renal colic for the past four days. A CT scan showed a well-defined, irregularly marginated, lobulated exophytic mass lesion approximately 40 mm × 33 mm in size in the lower pole of the right kidney. The patient underwent two CT-guided biopsies revealing mostly necrotic tissue and a few large polygonal cells with granular cytoplasm. IHC for cytokeratin was negative in these large cells. A histological diagnosis of chronic interstitial nephritis was made. However, radical nephrectomy was done as radiological features were more in favor of a malignant neoplasm. On microscopy, a clear cell carcinoma was seen extending into the perinephric tissue [10].

In a study by Dhingra et al., a 58-year-old female presented with chief complaints of intermittent epigastric and right upper quadrant pain with associated nausea and vomiting. CECT demonstrated a 9.8 cm heterogeneous, mildly enhancing renal mass arising from the interpolar region of the right kidney with perinephric fat stranding. A biopsy revealed necrotic cellular material, raising the possibility of a necrotic neoplasm. However, the diagnosis of renal cell carcinoma and XGP was considered in the differential after clinicopathological correlation. The patient was initially lost to follow-up, and repeat CT imaging after 2 years showed an interval decrease in the size of the mass to 3.0 × 4.0 cm. Repeat biopsy revealed sheets of foamy, lipid-laden histiocytes, chronic inflammation, and areas of fibrosis. These abundant histiocytes were positive for CD68, giving the final diagnosis as XGP [11].

Daoud et al. reported the case of a 48-year-old male with complaints of malaise, fever, chills, and left flank pain. Nephrectomy was performed for the left dysfunctional kidney. On microscopy, misinterpretation of foam cells as clear cells is the most important diagnostic challenge for the pathologist. The final diagnosis of XGP was considered by IHC [12].

Danuta et al. studied the expression of vimentin and CD68 in XGP and observed that with the progression of fibrosis, vimentin expression and the number of CD

68 positive cells were reduced, indicating vimentin as a promising marker of tubulointerstitial fibrosis. Immune stains help to reduce the probability of a false diagnosis of RCC in XGP cases and also help distinguish XGP from other entities [13]. The treatment of choice for diffuse XGP is nephrectomy with resection of all other involved tissues, with or without antibiotic therapy [14].

Conclusion

The clinico-radiological findings of XGP can mimics features of malignancy like RCC in adults and Wilms tumor in the pediatric age group. The overlap of these features plays part in the frequently noted delay in making a definitive diagnosis. So, CT scan evaluation, histopathology along with IHC are crucial in reaching the diagnosis of XGP.

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Competing Interest: None Declared

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